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POLIOMYELITIS AND ITS RELATION TO RECENT TONSILLECTOMY.[1]

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THESE notes were compiled after a review of some of the literature on the subject of poliomyelitis and its relation to recent tonsillectomy. Particular reference has been made to a survey of present knowledge in regard to acute anterior poliomyelitis by A. J. Rhodes, M.D., F.R.C.P.E., which appeared in the Bulletin of Hygiene of June, 1947.

Distribution of the Virus.

Amongst intimate contacts (family and playmates) of a patient suffering from poliomyelitis, the virus is frequently found, particularly in children and even in infants. It is probable that it is in the naso-pharynx for a few days only. *But it has been found there for up to two weeks.* It is more usually recovered from the stools, up to two months after contact. The majority of the contacts exhibiting the virus remain healthy though not immune. A few develop abortive attacks, and a very few paralytic attacks. *(Gear and Mundel (1946) detected virus in the stools of* a boy who, twelve days later, developed clinical poliomyelitis.) Another case has been reported in a patient who became ill nineteen days later.

The virus has been found in subjects who gave no history of contact, and in other cases in an inter-epidemic period.

[1] Read at a meeting of the Oto-Rhino-Laryngological Society of New South Wales on May 4, 1950.

The Incubation Period.

The incubation period has been estimated to be from five to thirty-five days, with an average of 12·2 days ± 1·1 *(Casey, 1942).*

The Portal of Entry of the Virus.

In experimental work in monkeys, the virus appears to enter via the protoplasm of the axons of the afferent nerves *and the sympathetic nerves of the alimentary* and respiratory tracts. It does not multiply in the nerves, but does so in the cells of the cranial and spinal ganglia, associated with those nerves. On reaching the brain stem or the spinal cord, it shows a predilection *for motor nerve cells. In the central nervous system it* ascends or descends via the axons of the nerve tracts.

Faber (Faber and Silverberg, 1948) is considered to be an authority on the pathology of the disease in man. Applying the conclusions of experimental evidence in monkeys to man, he believes that the virus enters the nerve terminals in the mucosa of the alimentary and *respiratory tracts. It ascends the axons of the afferent* nerves to the first neuron (nerve cell), where it multiplies. Nerves without a superficial connexion—for example, efferent motor nerves to muscles—are unlikely to transmit the virus, unless these endings or axons have been exposed *surgically.*

From the first neuron, in the ganglia, the virus may spread by a central axon, as in parts of the trigeminal, facial, glosso-pharyngeal and vagus nerves, to the brain stem, where it meets its first synapse in relation to a *sensory nucleus. A synapse is considered to form a* definite barrier to the progress of the virus. In the olfactory system, the first neuron is in the nasal mucosa, and the first synapse or block in the olfactory bulb. In the sympathetic system, the first neuron and first synapse

are in the sympathetic ganglia, while in the parasympathetic system, the first neuron and synapse are in the submucosa of the alimentary tract or tracheo-bronchial tree.

The best method of determining the portal of entry, therefore, is to examine the site of the first neuron. This Faber and Silverberg did in 1946 in an examination of the subjects in eight fatal cases (five bulbar and three spinal). They found that (i) the trigeminal afferent system (nose, mouth and pharynx) was frequently involved, (ii) the visceral afferents of the glosso-pharyngeal and vagus nerves (mouth, pharynx, œsophagus, stomach and intestines, and bronchi) were fairly often involved, (iii) the gustatory afferents of the facial, glosso-pharyngeal and vagus nerves were occasionally involved, (iv) the sympathetic system was occasionally involved, and (v) the vagal efferent system, or parasympathetic, and the olfactory system were not involved. The afferent neurons involved have no apparent relationship to the site of the motor cells first affected.

These and other workers have come to the conclusion that there is no single portal of entry, but that the virus may reach the central nervous system in several ways. The most common portal of entry is from the nose or pharynx via the afferent axons of the trigeminal, glosso-pharyngeal and vagus nerves. Evidence has been produced to show that the virus could enter from the small gut via sympathetic fibres.

This mode of entry via afferent axons means that the virus always enters the central nervous system via a synapse or block. Within the central nervous system the first cells to be involved will be sensory or connecting neurons. From these spread may occur to adjacent motor cells by short connector fibres and to more distant cells by way of the longer tracts. Spread to the susceptible motor cells will thus mean that the virus will cross at least two synapses.

Most workers agree that the site of entry in the normally acquired disease bears no relation to the level of the first motor paralysis.

Despite the most common portal of entry—that is, via bulbar afferents—bulbar poliomyelitis is less common than spinal and in most epidemics constitutes about 11% of cases. Its incidence may, however, rise as high as 28%, as it did among servicemen in the Malta epidemics during the second World War (Bernstein *et alii*, 1945).

Poliomyelitis and Recent Tonsillectomy.

During an epidemic it has been shown that amongst intimate contacts of an infected subject, the virus is frequently found in naso-pharyngeal washings for three days and in the stools for up to two months. Sabin believes that it can be found in the mucosa of the pharynx for longer than three days.

Many attempts have been made to determine why some individuals harbouring the virus develop clinical poliomyelitis while others do not. It has been suggested that there is a delicate balance between the host's resistance and the virus, and that any factor lowering the host's resistance may precipitate the disease. Possible precipitating factors cited have been exposure to extremes of temperature, undue fatigue, previous or concomitant upper respiratory, intestinal or specific infection, and finally trauma, which includes surgical trauma. And in surgical trauma must be included tonsillectomy.

Experimental Evidence.

There is experimental evidence to show that if the virus is present in the pharynx at the time of or shortly after operations on the pharynx, clinical poliomyelitis may be precipitated and the disease is likely to be of the bulbar type. The evidence is as follows.

1. Sabin (1938) injected a suspension of virus around the tonsil as deeply as the bone in a series of 20 monkeys. Of this series 18 developed poliomyelitis, which was in 13 cases of the bulbar type.

2. Monkeys can be infected by soaking the cut end of the sciatic nerve in a suspension of virus (Hurst, 1930). The virus spreads rapidly centripetally and can be demonstrated in the nuclei of the lumbar part of the spinal cord before it is found in the higher centres. Bodian and Howe (1941) showed that the virus ascended in normal nerves, but did not multiply therein. The fact that the virus was unable to ascend degenerating nerve proved to them that it ascended in the protoplasm of the axonic fibre. (If naked axons are exposed in the human pharynx and the virus is present it may ascend those axons.)

3. Leake in 1935 reported fortuitous experiments on human beings. Throughout America at that time attempts were being made to immunize children with different virus suspensions. Twelve cases of paralytic poliomyelitis were reported to have followed such attempts within six to fourteen days of intradermal or subcutaneous injection. Six deaths occurred. Poliomyelitis was not epidemic at the time. In all cases the paralysis developed first in the limb inoculated or in the contralateral limb. If it is assumed that the virus ascended the axons of the sensory nerves of the limb, then the first motor cells affected were at the level of entry of those axons. (If virus is introduced into the tissues in man, as is possible in tonsillectomy, the first motor cells affected would be likely to be those at the level of entry of the afferent neurons—in this case the bulbar motor nuclei.)

Statistical Evidence.

There is statistical evidence to support the view that tonsillectomy performed when the virus is present in the pharynx is likely to precipitate clinical poliomyelitis, usually in the bulbar form. The evidence is as follows.

1. John Anderson (1943), reviewing the 1943 epidemic in Utah, concluded that the incidence of poliomyelitis in subjects of recent tonsillectomy was 2·6 times greater than that in the general child population and that the incidence of the bulbar form was 16 times greater.

2. Data from various sources up to 1941 reviewed by Fischer and others (1941) showed that of 87 cases of poliomyelitis occurring after recent tonsillectomy, 58 cases were of the bulbar type. Of these 58 bulbar cases, almost all developed seven to twenty-one days after the tonsillectomy; the great majority between the tenth and fourteenth days, a very few as early as the fifth day, and a very few as late as the twenty-sixth day. The occurrence of the majority between the tenth and fourteenth days cannot be due purely to chance.

3. Aycock (Faber, 1949) reviewed 170 cases in which poliomyelitis followed recent tonsillectomy and found that in 121 (or 71%) during the first thirty days the condition was bulbar in type, whereas in the thirty to sixty day period it was bulbar in type in only 20%.

If we accept Anderson's conclusion that among subjects of recent tonsillectomy, during an epidemic, the incidence of poliomyelitis is 2·6 times greater than that in the general population of the same age group, then of 100 cases of poliomyelitis following tonsillectomy, approximately 38 cases would be coincidental. In other words, they would have occurred if tonsillectomy had not been performed. If we also assume that the ratio of bulbar to spinal and abortive forms in that 38 would be similar to the ratio of these forms in the general population, say 1:4 (which would be a high figure), then in eight of the 38 cases the type would be bulbar and in 30 spinal or abortive.

Aycock has shown from collected figures that of 100 cases of poliomyelitis following recent tonsillectomy, at least 70 are bulbar in type and 30 spinal or abortive. From the previous reasoning, the 30 spinal or abortive cases and the eight bulbar cases could be regarded as coincidental. This leaves 62 cases of poliomyelitis which must be assumed to have been precipitated by tonsillectomy, and all of these cases are of the bulbar type.

Fischer and others (1941), reviewing the Toronto epidemic of 1937, concluded that the higher incidence of poliomyelitis among children who had recently undergone tonsillectomy in that epidemic, was practically accounted for by the excess of bulbar infections which occurred.

Why should recent tonsillectomy precipitate a purely bulbar form of poliomyelitis?

It is assumed that the operation opens up a portal of entry for virus already in the pharynx. The afferent neurons which the operation could affect would be the

sensory nerves in the region of the operation—that is, the trigeminal, the glosso-pharyngeal and the vagus. But Faber, in a number of post-mortem examinations, found that these neurons were affected in almost all cases, whether the disease was bulbar or spinal. In other words, this portal of entry rarely produced the bulbar form of the disease.

It is suggested that, in tonsillectomy, the efferent motor nerves to the pharyngeal muscles are exposed and that the virus may ascend these axons directly to the motor cells of the *nucleus ambiguus*, where it multiplies and produces resultant paralysis.

Another possibility is that trauma of motor nerves in the pharynx may, by producing degenerative changes in the central motor cells, render those cells more susceptible to invasion by virus.

If this was so, one would expect surgical or non-surgical trauma to other muscles, in coincidental incipient poliomyelitis, to lead to paralysis of those muscles. I believe there is evidence that this does occur, but I cannot produce it here.

If the view is accepted that tonsillectomy performed on children during a poliomyelitis epidemic does increase their risk of developing the disease, the risk, however, is still quite small. On the basis of the Toronto epidemic, it was estimated that of children in the general population between the ages of three and twelve years, 2·7 in every 1000 developed poliomyelitis. Among those children of the same age group estimated to have had tonsillectomy performed at the height of the epidemic, it was estimated that 5·4 in every 1000 developed poliomyelitis. But in the extra 2·7 cases the disease was of the bulbar type.

Conrad Wesselhoeft, clinical professor of infectious diseases at Harvard University, said in April, 1949:

> I was one of those who, as a consultant in infectious diseases, urged this ruling (that tonsillectomies be banned during the summer months), on the grounds that the operation is elective and could be postponed to the colder months, when there was less likelihood of the polyomyelitis virus being present in the naso-pharynx. Last year I revised my opinion on this. . . . Tonsillectomies could continue through the summer months, provided there were no cases of poliomyelitis being reported in the community and no known possibility of exposure from outside.
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> . . . until we have some quick and practical method of determining the presence of the virus of poliomyelitis in patients, on whom tonsillectomy is contemplated, we must rely on epidemiological data. . . .

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POLIOMYELITIS AND TONSILLECTOMY: A REVIEW OF THE LITERATURE FOR THE OTO-RHINO-LARYNGOLOGICAL SOCIETY OF NEW SOUTH WALES.[1]

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ON reviewing the literature concerning poliomyelitis and tonsillectomy, one cannot fail to note that two groups of critics have emerged: physicians, on the one hand, advise caution and cessation of tonsillectomy during the epidemic period of poliomyelitis; the ear, nose and throat fraternity, on the other, whilst remaining cautious, suggest that the physicians have insufficient evidence to support this advice.

We see how Cunning, of New York, at the request of the Laryngological, Rhinological and Otological Society, conducted a survey based on data covering 1947. He felt that "operations should not be indefinitely postponed simply because summer months are the months that poliomyelitis is prevalent". Then Faber, writing for *Pediatrics* in February, 1949, reexamined Cunning's reports of 1947, together with other factual material relating to the question, and concluded that "proofs previously offered as causal relationship between incidence of poliomyelitis and tonsillectomy during epidemic times were still valid, and that evidence for this had not been refuted by the Cunning survey".

However, Cunning retaliated in *Laryngoscope* (May, 1949) with these conclusions:

> After 10 years' study of this subject, reviewing over 17,000 poliomyelitis cases and 35,000 tonsillectomy cases, I am still of the same opinion as I was one year ago—that no definite causal relationship between tonsillectomy and poliomyelitis has been established, and I do not believe that tonsillectomy should be postponed indefinitely simply because the summer months are the months during which poliomyelitis is prevalent.

Nevertheless, he adds this corollary:

> If there is a distinct rise in the poliomyelitis rate, bordering on epidemic proportions, all elective operations should be postponed.

In the past few weeks here in Australia we have enjoyed a very similar grouping of the writings on this subject in THE MEDICAL JOURNAL OF AUSTRALIA.

A review of the literature suggests that some middle course is advisable, if consideration is given not only to this problem of poliomyelitis but also to the other numerous hazards of tonsillectomy.

The removal of tonsils and adenoids is extremely popular (nay, it is almost a ritual nowadays), so the question of when operations must be performed is of no mean importance. The winter months are unfavourable because of respiratory infection. All of us have experienced the reduced lists of tonsillectomies at the public hospitals during this period: the children are too ill to come to hospital for the removal of their tonsils.

So the most popular time for doing tonsillectomies is spring, summer and early autumn, if one is to avoid the hazards of respiratory infections; but the advocates of the extreme precautions have suggested abstaining from the removal of tonsils and adenoids in the summer and late autumn months.

Now, if the period including the summer months to those of late autumn is taboo for removal of tonsils and adenoids, because of the incidence of poliomyelitis during this time, and the children are too ill during the winter months to present themselves at hospital for the removal of tonsils, there is very little time left in which the operation can be performed. Hence you can see that the person concerned with the removal of tonsils and adenoids has his back to the wall. The time in which he can perform his operation is extremely limited, and hospital accommodation is

[1] Read at a meeting of the Oto-Rhino-Laryngological Society of New South Wales on May 4, 1950.

becoming more and more scarce every year. So it is easy to understand how each new edition of the ear, nose and throat journals is read with increasing interest, to see whether it supports, or detracts from, the original advice—to abstain from tonsillectomies during the epidemic period, whether the incidence has reached epidemic proportions or not.

Wesselhoeft, of Boston, writing in *Laryngoscope* of July, 1949, intimates that similar experiences were encountered in his part of the world:

> There, there was a ban on tonsillectomies in the summer months, urged on the grounds that tonsillectomy is elective and could be postponed to the cooler months, when there was less likelihood of there being poliomyelitis virus in the nasopharynx.

However, Wesselhoeft revised his opinion on this, recommending that "the ideal time for tonsillectomies in that part of the country was immediately after the close of school in June; also, that tonsillectomies could continue through the summer months, provided"—mark you—"that there were no cases of poliomyelitis reported from the community and no known possibility of infection from outside".

Wesselhoeft states, further:

> In Massachusetts last summer the State Board of Health, through weekly bulletins, kept the hospitals informed of the situation of poliomyelitis in this State, as well as over the country at large.

He considers that "it would seem that this method offers a satisfactory solution to the tonsillectomy problem". He continues:

> In this discussion we have come to realise that other dangers beside poliomyelitis confront the operation, and to be forced to carry it out when upper respiratory infections are most prevalent is a disadvantage to be seriously considered. That we were carried too far in our zeal to prevent poliomyelitis through a seasonal ban on tonsillectomy is now clear; but this is just one of the many errors which have been made in the numerous efforts to fight this disease.
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> . . . until we have some quick and practical method of determining the presence of the virus of poliomyelitis in the patients on whom tonsillectomy is contemplated, we must rely on the epidemiological data as supplied in Massachusetts. The many errors committed in the field of poliomyelitis are contributable to the fear and panic aroused by this disease. However, we must understand that our concern regarding tonsillectomies is still real and logical.

Speaking of "fear and panic aroused by this disease"—witness the recent publicity given to whooping-cough and diphtheria injections. What a tragedy it would be if this were to influence a large number of parents to refrain from seeking diphtheria immunization for their children!

Wesselhoeft mentions the presence of the virus of poliomyelitis in the naso-pharynx. There is still some obscurity concerning the organism in poliomyelitis. Cunning, of New York, states:

> Authorities now regard poliomyelitis not as a single disease, entirely caused by a sole agent, but, rather, as a group of diseases having in common certain clinical symptoms, and caused by a family of more or less related viruses. Evidence has been presented that at least three immunogenic types of poliomyelitis virus exist, each type consisting of several individual strains.

The virus of poliomyelitis is believed to be widely disseminated throughout the general population during periods of epidemics, and is commonly recovered from fæces of asymptomatic carriers during these periods. Kessel and Moore, during an interepidemic period, recovered poliomyelitis virus from both tonsils and fæces of five out of 136 people tested during a period from May to September, 1942.

Theoretical factors governing the possible invasion of the neural tissue have been set forth on the basis of reduced resistance following anæsthesia, nutritional deficiency and anoxia. The specific affinity for neural tissue on the part of the virus, together with the known effect of anoxia on the nervous system, warrants consideration of these theories.

Late experimental work would tend to favour the upper part of the alimentary tract (pharynx) as a portal of entry, while earlier reports favour the lower part of the alimentary tract as a site of entry.

In the examination of the peripheral and central nervous tissue of eight persons who had died of acute poliomyelitis, Faber and Silverberg concluded that the pharynx appeared to be an essentially favourite site for the primary penetration of the virus into the body. In this neuropathological study, the trigeminal (fifth cranial) nerve and visceral afferent (ninth and tenth cranial) systems were predominantly involved.

In contrast to early experimental evidence with monkeys, it was noted that no involvement of the olfactory bulb was found. However, it was thought that the virus failed to reach the olfactory mucosa in infective amounts at the time infection was initiated.

In 1944 Faber, Silverberg and Dong concluded that, in the cynomolgus monkey, the nasal mucosa was highly vulnerable to poliomyelitis virus. Faber and his associates concluded that the infection was nerve-borne from the mucous surfaces to the appropriate peripheral ganglia, and thence to the central nervous system. It was stated, further, that the presence of bare nerve endings was not essential to the penetration of the virus.

How then does tonsillectomy affect the patient during an epidemic of poliomyelitis?

"It has been reported", states Cunning (in May, 1949), "that a human poliomyelitis virus may be grown in extraneural tissue." Sabin claims that his experimental work supports the contention "that the operation provides a portal of entry, through the traumatized cranial nerves supplying the tonsillar fossa and the nasopharynx, to virus already present in that region".

Cunning states that an experimental vaccine has successfully immunized monkeys. He considers "that, from all these reports, it may not be too optimistic to hope that, in the near future, a definite method of prevention or control of the disease may be possible, which will make the question as to a causal relationship of tonsillectomy to poliomyelitis merely an academic one".

Wesselhoeft, of Boston, writing in the *Laryngoscope* of July, 1949, discusses "whether tonsillectomy constitutes a real danger to the patient during the incubation period or carrier state of poliomyelitis". He states:

> The evidence is that there is such a danger, as illustrated in the K——— family of Akron. There were six children in the family, and five were tonsillectomies on the 22nd August. By the 7th September, all had poliomyelitis of the bulbar type; and three of them died. The one who was not operated on showed no signs of illness, but the virus of poliomyelitis was recovered from the stool. There were only two scattered cases of poliomyelitis in Akron prior to this family epidemic, and there were only six additional cases in that city during September.
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> The most probable exposure of this family was four weeks previous to the tonsillectomies, during a visit to relatives in a distant community where poliomyelitis was present. Other cases have been presented where bulbar poliomyelitis followed closely on tonsillectomy.

Sheppard, in 1910, reported the tonsillectomy-poliomyelitis sequence and the predominantly bulbar character of the symptoms. In 1928, Ayer reported nine cases, all bulbar. Aycock and Luther reported 16 cases, of which 12 were bulbar or bulbo-spinal. Krill and Toomey reported five nearly simultaneous cases—with three deaths—in a single family, following five tonsillectomies performed on the same day.

In 1942, Aycock reviewed the subject at length, collecting from the literature and his own experiences some 170 cases in which the operation had been followed, within thirty days, by poliomyelitis, which was bulbar or bulbo-spinal in 121 cases, or 71%. Since that time, many other cases (including 86—of which 24 were bulbar—from Cunning's 1946 and 1947 surveys) have been reported. All reports show a large proportion of the bulbar type when operation was performed thirty days (the approximate upper limit of incubation period) or less before the onset of symptoms.

Here is a case to add local interest to this phenomenon of tonsillectomy-poliomyelitis sequence:

A boy, aged fourteen years, had his tonsils and adenoids removed on December 14, 1949. Ten days later (on December 24, 1949) he became drowsy and nauseated; he vomited the next day and complained of sore throat and difficulty in swallowing. By December 27 he was feverish and restless, with a temperature of 103° F., and experienced difficulty in breathing. By this time, there was a considerable amount of mucus in the throat. On December 28, 1949, the patient was admitted to the Royal Alexandra Hospital for Children. He was cyanosed and gasping for breath, and was considerably embarrassed by the mucus in his throat. On his arrival in the ward, his breathing stopped, and he was put in a respirator—but without effect.

Post-mortem examination showed a well-nourished, male child. Inspection of the throat revealed that the tonsillar fossæ were healed, while the macroscopic appearance of the spinal cord showed the presence of œdema in the cervical and lumbar regions. However, the histological appearance of the cord revealed acute inflammatory lesions of poliomyelitis in the medulla, cervical and thoracic regions. The intensity was slightly less in the mesencephalon, pons and lumbar cord. The diagnosis was bulbo-spinal poliomyelitis.

This patient's younger brother, aged nine years, who had not undergone any operative procedures, on December 27, 1949, developed abdominal pains and vomiting; he complained also of headaches and pains in the back. It was noticed that he had weakness in both legs and pyrexia. On December 29, 1949, he was admitted to the Royal Alexandra Hospital for children, with a temperature of 101° F. Lumbar puncture produced cerebro-spinal fluid containing 135 leucocytes (90% polymorphonuclear and 10% mononuclear) per cubic millimetre and he protein content was 30 grammes *per centum*. By January 14, 1950, his muscle chart was normal. This patient was discharged from hospital on January 17, 1950, having experienced an attack of spinal-paralytic poliomyelitis.

Karen Helms, of Sydney, reports in THE MEDICAL JOURNAL OF AUSTRALIA, 1941:

> Of 711 patients infected in the 1937-1938 epidemic in New South Wales, seven are known to have had tonsillectomy and adenoidectomy seven to twenty-two days prior to the onset of the illness.

The Journal of the American Medical Association made the following remarks in an editorial statement on June 4, 1949:

> *The Journal [of the American Medical Association]*, March 21, 1942, warned that poliomyelitis, particularly the bulbar form, increased greatly in children after tonsillectomy or adenoidectomy in epidemic areas. Reports of Stillerman, Fischer, Maxwell, Marks, Top, Aycock and Sabin were cited. Since that time, avoidance of such operations during epidemics has been almost universally adopted. Recently otolaryngologists seem inclined to the belief that a causal relationship does not exist between the two, and that bulbar poliomyelitis following tonsillectomy is probably purely coincidental.

Hereunder is a summary from the *Annals of Otology, Rhinology and Laryngology* of June, 1947:

1. A review is presented of 492 cases of poliomyelitis in hospitals in San Francisco during the period 1941 to 1945.

2. The cases reviewed were found to have originated from 34 counties in the State of California, which reported 2057 cases of poliomyelitis during the five-year period for the same counties.

3. A survey of hospitals in the 34 counties concerned reveals a total of 57,796 known tonsillectomies performed during the five-year period.

4. In one group of patients with tonsils present, there were six deaths; while in another group with tonsils removed, there were 11 deaths.

5. In the group with tonsils present, there were 11 cases of bulbar and bulbo-spinal type poliomyelitis; while in the group with tonsils removed, there were 24 cases of bulbar and bulbo-spinal poliomyelitis.

6. Of 492 cases of poliomyelitis surveyed, there were 11 cases of poliomyelitis following recent tonsillectomy. There are 314 cases of poliomyelitis following tonsillectomy reported in previous literature.

7. Of 11 cases of poliomyelitis following tonsillectomy, seven cases occurred within the probable period of incubation.

The *Annals of Otology, Rhinology and Laryngology* of June, 1947, also came to these conclusions:

1. That the incidence of poliomyelitis to the general population in an epidemic year (1943) was in the ratio of 1 to 1960; while, for the same period, the incidence of poliomyelitis following tonsillectomy was in the ratio of 1 to 1782 (five cases in 8910 known tonsillectomies).

2. That the incidence of poliomyelitis following recent tonsillectomy is not greatly out of proportion to the ratio of disease to the general population during an epidemic year.

3. That when poliomyelitis occurs following tonsillectomy, it is more apt to be of the bulbar type.

4. That there is a higher incidence of bulbar and bulbo-spinal type of poliomyelitis in patients who have undergone tonsillectomy than in those who have not, the ratio being two to one.

Finally, here are some figures quoted by Cunning in *The Laryngoscope* of May, 1949. Two opposing interpretations have been made on his figures. Cunning's own conclusions suggest that no causal relationship between tonsillectomy and poliomyelitis has yet been established; whilst Faber considers that Cunning's figures contradict his conclusions. In the light of this, one cannot fail to appreciate the remarks of E. Cowper Tamplin (as reported in *The Journal of Laryngology and Otology* of May, 1949) when, presiding over a meeting for the discussion of this very subject, he stated:

> Statistics are useful and necessary, but we should be as careful in drawing conclusions from them as we should be from our array of selected opinions: both can be made to prove anything.

However, Cunning reports as follows:

> During 1948, the United States suffered an epidemic of poliomyelitis comparable to the most severe in its history. The United States Public Health Service reported a total of 27,894 cases. Continued co-operation from our State Chairman and State Health Departments resulted in a compilation of statistics from 10,624 of all cases occurring—a percentage of 39. This compares with 4,331 cases studied in 1947—a percentage of 40; and 2,290 in 1946—a percentage of 8.
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> Of the 10,624 cases on which data were received, 38 had histories of previous tonsillectomies—an incidence of 0·36%. A breakdown of the 10,624 cases revealed that 1,481 had the bulbar type of poliomyelitis. In this bulbar group, 27 were preceded by tonsillectomies—an incidence of 1·7%. Of the 5,859 cases listed as spinal type, 8 (or 0·13%) gave histories of tonsillectomies. In the 3,284 cases recorded as "mild", 4 (or 0·12%) had had recent tonsillectomies. All tonsillectomies occurred 1 to 30 days prior to the onset of poliomyelitis.
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> In the 10,624 total cases in the survey, 32 (or 0·3%) were preceded by operations other than tonsillectomy (appendectomy, herniotomy, etc.). In the 1947 survey, 81 (or 1·9%) of the 4,331 cases were preceded by operations other than tonsillectomy; and, in 1946, 26 (or 1·1%) of the 2,290 cases were preceded by similar "other operations".
>
> Keeping in mind the warning that, during epidemics, children who are tonsillectomized have an increased danger, especially to bulbar poliomyelitis, it is interesting to observe that, in the 1946 series of cases, out of a total of 382 bulbar cases, 355 (or 92·9%) occurred without any preceding operation. In the 1947 group studied, 509 were of the bulbar type, of which 487 (or 95·6%) occurred without any recorded history of recent tonsillectomies or other operative procedures. In the year 1948, 1,481 bulbar cases occurred in the group under survey. Of these bulbar cases, 1,450 (or 97·9%) occurred without history of recent operations.

Cunning concludes by saying:

> After 10 years' study of this subject—following over 17,000 poliomyelitis cases and 35,000 tonsillectomy cases—I am still of the same opinion as I was one year ago, namely, that no definite causal relationship between tonsillectomy and poliomyelitis has been established; therefore, I do not believe that tonsillectomy should be postponed indefinitely simply because the summer months are the months during which poliomyelitis is

prevalent. If, however, in any community there is a distinct rise in the poliomyelitis rate, bordering on epidemic proportions, all elective operations should be postponed.

Until evidence of a conclusive nature is forthcoming, the surgeon himself should decide whether or not to perform tonsillectomy during the summer months, and whether the dangers of delaying the operation are greater than the still undetermined risk of increasing susceptibility to poliomyelitis.

So we are back where we started—and what has it profited us?

1. Although a few writers have claimed that the tonsillectomy-poliomyelitis sequence is coincidental, they do not suggest that the operation should still be performed when the number of cases has reached epidemic proportions.

2. Very few figures are quoted to illustrate the ratio of patients undergoing tonsillectomy with an uneventful recovery, to those which developed poliomyelitis during the epidemic season. The publicity given to the tonsillectomy-poliomyelitis sequence has so reduced the number of tonsillectomies performed during the epidemic season, that the figures, if obtainable, would not now be entirely representative. However, it would seem that, for every 2000 tonsillectomies performed during the epidemic period, one is followed by poliomyelitis.

3. The type of poliomyelitis following tonsillectomy is usually bulbar.

4. Numerous cases of bulbar poliomyelitis following tonsillectomy have been reported.

5. If the still undetermined risk of removing tonsils and adenoids during the poliomyelitis season is to be reduced by means other than postponing the operation, there is a need for (*a*) a practical method of determining the presence, or absence, of the poliomyelitis virus in the prospective patient, and (*b*) a practical method of obtaining information concerning the incidence of poliomyelitis victims in the vicinity of the prospective tonsillectomy patient's home and school.

6. The risks involved by tonsillectomy during the epidemic season should be considered, together with the other numerous hazards of tonsillectomy and the urgency of the indications for performing the operation.

Acknowledgements.

I should like to thank Dr. Raymond A. R. Green and Dr. S. E. L. Stening for allowing me to cite their cases; also my father, Dr. W. Alexander Dunn, for his assistance in abstracting from the literature.

TREATMENT OF POST-PARTUM AND MENOPAUSAL OBESITY.

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THE treatment of obesity with appetite-depressant drugs of the amphetamine group has developed greatly since they were first used by Nathanson in 1937.

The exact mechanism by which they depress the appetite is not quite clear. Experimental work by Heinbecker, White and Rolfe (1944) and by Brobeck (1946) has shown that injury to the posterior portion of the paraventricular nuclei of the hypothalamus causes a great increase of appetite which produces obesity. This increased appetite begins abruptly after the damaging procedure to the nuclei. It has, therefore, been suggested that drugs of the amphetamine group act by depressing this appetite centre.

Beyer and Meek (1939) found that "Benzedrine" caused some delay in the emptying of the stomach and generally slowed intestinal activity, and this, too, may be a factor.

Goetzl and Stone (1948), in a series of experiments on six females aged between twenty-nine and forty-nine years, found that amphetamine sulphate in doses of 10 milligrammes was capable of simultaneously producing a measurable decrease in olfactory acuity and a decrease in the intensity of the sensation of appetite, and also induced a sensation of satiety. They also suggested that the effectiveness of the drugs in decreasing the sensation of appetite could be measured by noting its influence on olfactory acuity.

Richardson (1947), in a review of several series of cases of obesity treated by appetite-reducing drugs and simultaneous Calorie restriction, found that in each group there were a large number of patients who abandoned treatment at an early stage. A further characteristic was that very few of the really obese were able to reduce their weight to anything approaching their normal weight.

Hawirko and Sprague (1945), in an unselected series of 162 patients with exogenous obesity who were treated in this manner (with, in some cases, the addition of small doses of thyreoid), found that 90 patients did not persevere with the treatment for more than two months. Some of them carried on with the treatment for only a few weeks, even though they were doing well. Of the remaining 72, all but six patients lost more than 20% of their overweight, five of these originally weighing more than 200 pounds. These six cases were considered to be failures.

The weight loss varied from 10 to 114 pounds, although the patient who lost 10 pounds was, in fact, only 16 pounds overweight. Of the patients who weighed less than 200 pounds at the start of the treatment, all except one lost 30% or more of their excess weight, whereas 14 out of 30 who weighed more than this initially failed to lose so high a percentage.

Armstrong (1949) treated 90 patients, but was unable to follow up 39. Of the 51 who were followed up, 12 or 24% lost 20% or less of their overweight, though three of them continued for only three weeks. Twenty-one patients weighed more than 200 pounds initially, and of these five lost less than 20% of their overweight. The maximum weight loss was 81 pounds in a patient who weighed 378 pounds initially.

None of these observers gave any reason for the failures, or attempted to follow up those patients who had abandoned treatment; and it was, therefore, decided to treat a small series and investigate the failures.

A number of patients were treated in the following way. The patients were given a thorough physical examination, but no pathological or radiological investigations were carried out. Those who had obvious thyreoid, pituitary or organic lesions were not treated, so that, as far as could be ascertained, the obesity was of exogenous origin. They were then given a 1500 Calorie diet with as high a protein and as low a carbohydrate content as was consistent with their financial circumstances. Fats were kept at a minimal level and fluids were restricted to about three pints a day. Specimen menus were planned for each individual patient, due regard being given to their mode of life, and they were told that these menus must be adhered to strictly.

The appetite-depressant drug used was dextro-amphetamine sulphate, and this was given twice a day in doses of five milligrammes. No pituitary gland extract was given, but after the fourth week of treatment one-tenth of a grain of thyreoid was added to the tablets, as Wolf (1940) had suggested that doses of this order would stimulate the patient's own thyreoid gland. No diuretics were given.

Twenty-nine patients were treated in this manner, of whom four were men. The ages of the females varied from twenty to fifty-four years. All the men lost considerable amounts of weight over a period of two months. Four of the women failed to return after the second week, although they had lost an average of five pounds during this period. Three women discontinued treatment after a month, one of them because she had not lost weight, and the others for no apparent reason, as they had been losing weight satisfactorily.

Of the remaining 18, 13 lost more than 20% of their overweight in three months; the remaining five patients lost less than this amount, and their treatment was considered to be a failure.

On analysis of these cases, and also of those of other observers, it appeared that the highest proportion of failures occurred in women, and further, that these patients could be divided into two groups: (i) those who had become obese shortly after a pregnancy; (ii) those whose obesity had commenced at, or just prior to, the onset of menopausal symptoms.

Ray (1947) had noted that obesity was a factor in aggravating the climacteric syndrome and in causing the appearance of symptoms when they might otherwise remain subclinical. In a series of 100 non-obese patients over the age of thirty-five years, only 18% had climacteric symptoms, whereas in a similar series of obese patients, the percentage was about 70. The diagnosis of this syndrome is made on vasomotor disturbances, nervousness, irritability, emotional instability and constitutional inadequacy.

The cause of obesity following pregnancy and occurring at the menopause is not definitely known, but it had been suggested that this was due to some subclinical endocrine deficiency, and that in post-partum cases it was possibly associated with infarcts in the anterior lobe of the pituitary. It was thought, however, that there might be non-endocrine factors causing obesity in these groups.

Barton and Wiesner (1948), in a study of special diets in the treatment of female infecundity, found that infective conditions, and particularly cervicitis, were often associated with obesity.

Grollman and Rousseau (1944), in reporting a series of cases of metabolic craniopathy, had noted that obesity, whilst not always present, was an extremely common finding, and they considered this to be one of the main features, the others being *hyperostosis frontalis interna* and varying neuropsychiatric symptoms. The syndrome was almost entirely confined to women, 65% of them being between the ages of thirty and fifty years. The bone changes were present in 98% of their cases. The basal metabolic rate was usually within normal limits. When obesity occurred it did not readily respond to treatment.

Hyperostosis frontalis interna can be diagnosed only by radiology, and is characterized by deposits of cancellous bone of great density in the inner table of the skull. These are nearly always limited to the frontal bone and are as a rule bilateral in their distribution.

Moore (1944), in a routine examination of 6650 X-ray films of the skull, found this condition present in 1·2% of the films. Grollman and Rousseau in their series of 4200 cases found it present in 4·1% of films. It is thus a relatively common condition.

In view of these reports, it was decided further to investigate the failures in the initial series, and a further number of post-partum and menopausal patients were also treated.

The investigations were as follows: (i) cervical examination; (ii) X-ray examination of the skull and pituitary fossa; (iii) estimation of the basal metabolic rate.

The cervical examinations were, as far as possible, carried out just after the end of a menstrual period, material for culture being taken and slides prepared. In those cases in which no pathogenic organisms were found, there was usually evidence of cervical erosion or tears, and in two cases silver rings were being used and these were removed. The commonest organisms found were *Bacterium coli*, *Trichomonas vaginalis* and a mixed staphylococcus and streptococcus infection.

The radiological investigations consisted of the taking of routine postero-anterior and lateral views of the skull. In addition a localized lateral view of the pituitary fossa was taken and the pituitary measurements were made on this film. The antero-posterior diameter of the fossa was measured from the *tuberculum sellæ* to the most distant part of the anterior wall of the *dorsum sellæ*. The depth was taken from the mid-point of a line joining the *tuberculum sellæ* and the posterior clinoids to the floor of the fossa.

Camp (1930) measured 500 normal skulls and found that the antero-posterior diameter of the pituitary fossa varied between 5·0 and 16·0 millimetres, the average being 10·6 millimetres, whilst the depth varied from 4·0 to 12·0 millimetres, the average being 8·1 millimetres.

In our series the antero-posterior diameter varied from 7·0 to 14·0 millimetres, and the depth ranged from 5·0 to 10·0 millimetres. Two patients whose measurements were in excess of the above were thought to have definite pituitary lesions and were not included.

The basal metabolic rate was estimated in the first eight cases, but, as these were within normal limits, and as most observers had found that there was no great alteration in the metabolic rate in obesity, at any rate up to the menopause, this was discontinued as a routine procedure. It had been decided that menopausal patients should be given small doses of thyreoid, so no basal metabolic rates were estimated in these cases.

The second series of patients were all females ranging in age from twenty-six to fifty-one years. Thirty-four patients were treated, and this included the five "failures" of the initial series, who were considered to be controls. Twenty-nine had cervical infection and five had cervical tears or erosions, and in addition seven had *hyperostosis frontalis interna*.

The patients were divided into three groups: (i) a post-partum group, (ii) a menopausal group, (iii) those with *hyperostosis frontalis interna*. The original "failures" were divided amongst these groups.

Treatment was then instituted as follows. The cervical condition was dealt with by the systemic use of antibiotics, penicillin, sulphathiazole *et cetera*, *plus* appropriate local treatment as required. For the first week of this treatment no dextro-amphetamine sulphate was given. The patients were told to carry on with their usual food, with the exception that sugar and all sugar-containing foods were rigidly excluded from the diet. After the first week the systemic use of antibiotics was stopped, and only such local treatment as was warranted by the patient's symptoms was carried out. The weight loss for this week was quite small, an average of about one pound per patient. They were then given the previously mentioned dietary and drug régime—that is, a 1500 Calorie diet, dextro-amphetamine sulphate *et cetera*. Those patients with menopausal symptoms were given small doses of ethinyl œstradial and one-tenth of a grain of thyreoid.

In Group I and Group II the weight loss for the second week increased in no uncertain fashion, amounting in some instances to six pounds and in no case less than two and a half pounds. These losses did not occur to the same extent in the cases of *hyperostosis frontalis interna*, in which no one lost more than two pounds.

The dietary and amphetamine régime was carried out for a further three weeks, the ethinyl œstradiol being increased slightly if required, but the amount of thyreoid was not increased. Six of the patients discontinued treatment within four weeks, though five of them had been doing well. When they were interviewed, their reasons were as follows. Two said that their mothers were ill, and that they could not carry out the diet whilst they were busy looking after them. One said that her husband disapproved (this was one of the original "failures"). One patient went abroad. The husband of one patient died, and the last patient "could not be bothered any more". One of the patients who stopped treatment had *hyperostosis frontalis interna* and had not done well. For the five weeks, the average loss per week was as follows: Group I, two and a half pounds; Group II, two pounds; Group III, one pound.

There appeared to be no relation between the degree of obesity and the amount of weight lost.

Further cervical examinations were again carried out as soon after a menstrual period as possible. In all except four cases a pronounced improvement was found. Of these four patients, three had shown weight loss, but this was well below the average for their groups. The fourth had shown weight loss within the group average.

A further course of antibiotics was then given to these patients, but without improvement in their cervical con-

dition, and very little further weight loss occurred in the three patients who were not responding well. The fourth patient continued to make a satisfactory weight reduction. The patients were then dieted for a further two months; the dextro-amphetamine was stopped for two weeks, and when it was started again, only five milligrammes per day were given, usually in two divided doses. The caloric value of the diet was kept at 1500.

The total average weight losses for the three months from the commencement of the treatment were as follows: Group I, 23 pounds; Group II, 21 pounds; Group III, eight pounds.

Discussion of Findings.

Though the number of patients treated was not large, and the results were not always satisfactory, the increased weight loss which followed the clearing up of infections of the cervix suggests that this may play an important part in the treatment of obesity in females who have become obese following a pregnancy or at the time of the menopause.

In those patients who had *hyperostosis frontalis interna* in addition to the infections of the cervix, the results were poor, and although Schneeberg, Woolhandler and Levine (1947) in a review of 675 cases in the literature and 25 cases of their own came to the conclusion that no definite syndrome was associated with the skull lesions, the above findings suggest that obesity in these cases is difficult to treat.

Summary.

A review of a number of cases of obesity treated by means of appetite-depressant drugs and Calorie restriction has been made, and some of the failures with this treatment have been followed up.

It is suggested that failure to lose weight, in those cases of obesity which occur after a pregnancy or with the onset of menopausal symptoms, may be due to some coexistent infection of the cervix, and that when this infection is treated, the loss of weight is greater than if the Calories are restricted without any treatment of the infection.

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THE PLACE OF RESTORATIVE RESECTIONS AND OTHER OPERATIONS IN THE TREATMENT OF CARCINOMA OF THE RECTUM.[1]

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TUTTLE'S book, which was published in 1903, contains an interesting discussion of what was then, and still is, a most controversial question—that is, the place of the various methods of excision of the rectum. In his book he stated that no one operation was suitable for routine use in the treatment of carcinoma of the rectum, and this is equally true today.

The operation chosen in an individual case should be one selected from about a dozen, and the choice should be determined mainly by the size of the tumour, its position, the extent of ulceration, the degree of malignancy of the tumour, the general condition and age of the patient, and the experience of the surgeon. Occasionally other factors such as the ability to cause the tumour to prolapse through the anus or the presence of fistulæ will also influence the choice of operation.

The various operations that will be discussed in this paper include abdomino-perineal excision,[2] perineo-abdominal excision,[2] synchronous combined excision,[2] abdomino-anal excisions, intraabdominal resection and anastomosis, abdomino-sacral excision, local procedures, the Hartmann operation, and the perineal operation.

EXPECTANT TREATMENT.

It occasionally happens that the patient refuses operation, or that the general condition is too poor to permit of any operation; but both of these occurrences are rare.

Usually, if patients are introduced to other patients who are attending for routine follow-up examinations many years after resection of cancer of the rectum, it is not difficult to convince them of the value of operation. The general condition of the patient may be poor owing to cardiac failure, uræmia, toxæmia or some other coexistent disease; but in most such cases it is worth while to persevere and to try to improve the general condition so that at least one of the lesser types of resection may be performed. If, on the other hand, the patient is suffering from jaundice or ascites due to metastases, the general condition will soon deteriorate and no resection is warranted.

While an estimate of non-resectability based on rectal examination is sometimes correct, this is not always so. In the absence of malignant infiltration immobility of a carcinoma of the rectum may be due to inflammatory adhesions, to an intussusception of the tumour into the distal portion of the bowel, or to its size alone if it fills the pelvis. A decision of non-resectability due to local fixity of the growth denies the patient any chance of cure, and it should, with few exceptions, be made only after the abdomen has been opened and a dissection attempted.

TUMOUR NOT RESECTABLE.

If after such a dissection a carcinoma of the rectum is found to be not resectable because of extensive perirectal malignant infiltration, or if it is not resectable because of the presence of many hepatic or peritoneal metastases or because of the extremely poor general condition, a colostomy is by no means always indicated. Rather should it be reserved for those cases in which, in addition, there is obstruction to the lumen of the bowel, or internal or extensive external fistulæ, or considerable distress due to persistent hæmorrhage or discharge from the surface of the tumour. In the absence of an intestinal obstruction there is no evidence that a colostomy *per se* prolongs the life of a patient with a carcinoma of the rectum. Rather, it has the opposite effect.

[1] Read at the annual general meeting of the Royal Australasian College of Surgeons at Brisbane on June 9, 1949.

[2] These operations are referred to as "combined radical operations".

FIXATION OF THE TUMOUR TO OTHER PELVIC VISCERA.

Fixation of the rectum by malignant infiltration to the vagina, prostate, seminal vesicles, uterus, left ureter, urinary bladder, small bowel or right ureter does not necessarily preclude resection of the tumour, since the involved portions or the whole of these organs may sometimes be successfully included in the resection. In the majority of these cases, and even when the vagina appears to be the only additional organ involved, the patient fails to survive for five years after such a resection. Nevertheless, even when it is quite obvious that the operation must only be a palliative procedure, it is frequently well worth while from the patient's point of view and should be performed whenever possible. In his book, Miles (1944) speaks very strongly in favour of reserving resections of the rectum for those cases in which a cure of the disease is possible; but such a view denies help to a considerable number of patients. For a resection of the rectum *plus* the whole or part of another viscus the synchronous combined excision offers the greatest advantages.

These operations of removal of the rectum *plus* another viscus are of greater magnitude than an uncomplicated resection, and it is to be expected that the operative mortality rate will be higher. On the other hand, it will be found that in approximately 10% of the cases in which the resection of the rectum and another viscus is considered to be only palliative because of the apparent malignant infiltration in the pelvis, the patient continues to survive after the operation and never shows any evidence of metastases. This happy result must be due to confusing perirectal inflammatory adhesions with malignant infiltration, and the possibility of such a mistake is sufficient reason for making every effort to resect what appears to be a locally "inoperable" tumour.

Such inflammatory adhesions may even be present while the tumour is still limited to the rectal wall—that is, when it is still an "A" case on Dukes's classification (Devine, 1937). Even in cases in which there are hepatic metastases, the adhesions causing the local fixity of the tumour may still be inflammatory.

The adhesions are more likely to prove to be inflammatory when the vagina is the only additional viscus involved. The attached portion of the vagina should always be removed; for no matter how certain the surgeon feels that the adhesions are only inflammatory, he may be wrong, and removal of portion of the vagina does not prolong the operation. Rather, such removal facilitates the resection of the rectum and, if desired, it allows the perineal wound to be closed and the pelvic cavity drained through the vagina. Removal of portion of the vaginal wall does, however, result in some delay in the clearing up of the infection in the pelvic cavity, and it may be a factor in the development of a perineal hernia or in the increase in size of a preexisting cystocele.

When it is necessary to remove the uterus together with the rectum, the ureters should be exposed for the whole of their lower portions before the dissection is proceeded with, for they may be drawn together by the inflammatory reaction.

If portion of a ureter is sacrificed, an attempt should be made to reimplant it into the bladder or to transplant it into the colon. It is probably not advisable to attempt to anastomose its divided ends. Often these procedures will not be practicable or successful, and a nephrectomy will eventually prove to be necessary.

Fixation of the tumour to the sacrum by malignant infiltration will sometimes prevent a resection of the rectum, palliative or otherwise, but this is not invariably so.

TUMOUR RESECTABLE, PRELIMINARY COLOSTOMY.

More excisions of the rectum are now performed in one stage than formerly, owing mainly to the improvement in the pre-operative and post-operative management of these patients. If an acute intestinal obstruction exists and cannot be relieved by other means, a preliminary colostomy will be required. If there is only a mild degree of obstruction it may be possible to relieve it sufficiently to permit a one-stage excision without increasing the dangers or difficulties of the operation; the colostomy should be opened at the end of these operations and allowed to drain into a bottle.

If extensive inflammatory adhesions with or without a localized abscess surround the rectum, a colostomy should be performed as the first stage, and if an abscess is present it should be drained. After a few weeks the inflammation will usually have subsided sufficiently for a resection to be performed. At the time of the operation there is no way of determining with unfailing accuracy whether adhesions are inflammatory or not, and therefore it happens that the surgeon is sometimes unable to decide at the time of the colostomy whether a resection will later be possible. It is, however, almost certain that in such cases any subsequent resection will not be of the "restorative" type.

If a carcinoma of the rectum is complicated by the presence of an ischio-rectal infection or multiple anal fistulæ, a preliminary colostomy is usually necessary, and at the same time drainage of the infection should be instituted. When the infection has lessened, a resection of the rectum may be feasible. Such a resection should be an abdomino-perineal excision of the Miles (1908, 1931) or of the Lahey (1930, 1939) type if the general condition of the patient is good; if not, a perineal excision is indicated.

Prior to an attempted resection of the rectum in the presence of a recto-vesical or other internal fistula, a preliminary colostomy should be performed; but a fistula between the rectum and the vagina does not usually necessitate a preliminary colostomy, since the fistulous track may often be resected *en bloc* with the rectum and the affected part of the vagina with relatively little difficulty.

When the patient is in a poor state of health and the tumour is in the lower two-thirds of the rectum, a two-stage perineal excision is the operation of choice even in the absence of infection, fistulæ or obstruction; and such circumstances provide another indication for the use of a preliminary colostomy.

TUMOUR RESECTABLE, BUT METASTASES PRESENT.

If the tumour is locally resectable, if there are only a few metastases, hepatic, peritoneal or inguinal, and if the patient is in relatively good condition, a resection should undoubtedly be performed. Removal of the rectum disposes of the bleeding and the evil-smelling and offensive, irritating discharge, and it will limit or prevent the malignant invasion of the ischio-rectal fossæ and of the nerves and other structures of the pelvis. Furthermore, the rate of growth of hepatic metastases and the deterioration of the general condition are probably not as rapid after the removal of an ulcerated primary tumour (Lahey, 1939). While the patient lives, which in many cases will be for a year or more and in a few favourable cases will be for a few years, he will be much more comfortable and, because the resection has been carried out, he may retain the hope of cure.

An important reason for the performance of resections of malignant tumours of the rectum in the presence of apparent metastases is that it is very easy to be misled on macroscopic examination and palpation and to make the diagnosis of metastases when none exist. Angiomata and adenomata of the liver are the greatest sources of error. If, from examination of the excised specimen, the pathologist classifies the tumour in the "A" group, it is unlikely that any hepatic or other nodules are metastases. If it is decided that the tumour is resectable, it should be resected irrespective of the presence or absence of enlarged inferior mesenteric lymph glands. Gabriel, Dukes and Bussey (1935) have shown how great is the possibility of error if reliance is placed on inspection and palpation during recognition of lymphatic metastases. These authors found that "conjectures with respect to metastases in the rectal, hæmorrhoidal or paracolic glands are more often wrong than right". Even if the meso-rectal lymph glands are enlarged and there are a few nodules in the liver which are indistinguishable macroscopically from metastases, it is still possible although not probable that the patient is really free from metastases.

The existence of a few hepatic metastases should not preclude a resection of the rectum, for it may happen that these visible metastases are the only ones, and if defeat is not admitted, their removal together with the whole or part of the lobe of the liver may occasionally be rewarded by permanent cure of the disease. After a resection of the rectum it is still possible for a solitary hepatic metastasis to remain localized for a few years and even then to be amenable to surgical treatment.

If the tumour has extended down to the anal canal and enlarged lymph glands have become palpable in one or both inguinal regions, then a resection of the rectum should be performed if this is still possible. To this resection should be added a block dissection of the glands of both groins, irrespective of whether the inguinal lymph glands appear to be affected or not. When the tumour has extended down to the anal canal or to the ischio-rectal fossa, it is not rational to perform a combined radical operation with as wide a removal of the inferior mesenteric lymph glands as is possible and at the same time to delay the removal of the inguinal lymph glands till they have become macroscopically enlarged.

The presence of a few hepatic or other distant metastases should influence the choice of operation, so that a greater effort is made to perform a restorative resection even if that entails removing less than the usual extent of the lymphatic field. In such cases a single-stage operation is to be preferred. If a restorative resection is not technically possible, then one of the combined radical operations, a Hartmann operation or a perineal excision, is indicated. Because of its low operative mortality rate a perineal excision is a very satisfactory palliative operation for tumours in the lower two-thirds of the rectum.

If there are widespread peritoneal plaques of malignant tissue, or if the liver contains many metastases, a resection of the rectum is not indicated, since the patient will probably have only a few weeks to live and, as has already been mentioned, there is no virtue in the routine use of a colostomy in these cases.

Tumour Resectable, No Apparent Distant Metastases, but General Condition Relatively Poor.

If the growth is resectable and there is no evidence of hepatic, peritoneal, inguinal or other distant metastases, then the choice of operation depends mainly on the general condition of the patient. If, under these conditions, the general condition is too poor for a combined radical operation, the choice is limited to one of the local procedures, to an extended Hartmann excision, or to a two-stage perineal excision. The choice between the two last-mentioned procedures depends on the situation of the tumour, with a preference for the perineal excision for the treatment of tumours situated in the lower and middle thirds of the rectum.

By the time a patient suffering from a carcinoma of the rectum attends for examination, he still has more than an even chance of having no metastases at a distance from the tumour, for all the "C" cases make up only 50% of the cases of carcinoma of the rectum seen in hospital. This chance of having no distant metastases in any individual case is greatly increased if, histologically, the tumour is shown to be of a low grade of malignancy (Dukes, 1944). These facts should be remembered before a patient in a poor general condition is submitted to an extensive operation from which the possible future advantages are greatly outweighed by the extra risks. A limited resection still offers a chance of cure to patients without metastases at a distance from the tumour.

As an estimate of the number of patients with carcinoma of the rectum who would have stood just as good a chance of being cured by a perineal excision, Dukes (1944), from a review of the pathological reports, placed the figures as "at least 80 per cent. of those without and 20 per cent. of those with metastases". There does not seem to be any comparison in the literature of two equivalent series of cases of carcinoma of the rectum, one treated by a perineal excision and the other by a combined radical operation. The nearest to this is the record of results published by Dukes (1944), who showed that when all the patients submitted to operation were considered and followed for five years, then of the patients submitted to a perineal excision 40·9% were alive compared with 39·2% of survivors after a combined radical operation. From the patient's point of view as regards ultimate survival no advantage can be claimed for the combined radical operations on these figures. However, there was "evidence that cases treated by combined operations were of a more advanced character" and therefore the two groups were not strictly comparable. Dukes also stated that in these cases the "difference in the operative mortality rates (which were 15% and 8·7%) has turned the scale but is unlikely to do so in the future because the operative mortality rate of the combined operation is steadily declining", and thus it is to be expected in the future that the patient in good general condition will benefit by a combined radical operation.

The figures reported by Dukes refer to patients operated on prior to 1944 and represent the results obtained at Saint Mark's Hospital by surgeons specializing in the treatment of carcinoma of the rectum. Their over-all mortality rate for all operations now used in the treatment of carcinoma of the rectum has fallen to 8·2% (Wilson, 1947); but as few perineal excisions are now performed at Saint Mark's Hospital it is not possible to compare their present-day figures of five-year survivals after the combined radical operations and after the perineal excision.

The main advantage of the perineal excision has been its low operative mortality rate, and this is still so; but, as this operation is now being more and more reserved for "poor risk" patients, it is to be expected that this low rate will not be maintained. This, however, does not invalidate its use in "poor risk" cases. Miles (1944) regarded the perineal method of excision of the rectum as being only a palliative procedure; but this is not in keeping with the facts, and many patients suffering from a carcinoma of the rectum have survived for ten or more years after a perineal excision.

For those surgeons who do not perform many resections of the rectum or who for any other reason have not been able to reduce their operative mortality rate to less than 15% and yet attain a resectability rate of 86% in all cases of carcinoma of the rectum, there can be no question but that they are going to have the greatest number of patients alive at the end of five years if, instead of trying to perform a combined radical operation as a routine, they perform a perineal excision on almost all the patients in whom the tumour is situated in the lower two-thirds of the rectum.

If the general condition is poor and the tumour is situated in the lower two-thirds of the rectum, a perineal excision is the operation of choice no matter how experienced the surgeon. The presence of an anal fistula in such a case is not necessarily a contraindication to a perineal excision.

For the treatment of tumours of the upper third of the rectum, which are resectable and which have occurred in patients in whom there is no evidence of distant metastases but whose general condition is poor, an extended Hartmann operation may sometimes be performed. This operation, which is an anterior resection of the rectum followed by an end colostomy, is the operation of choice in some such cases, but it has the great disadvantage that the poorly-drained pelvic cavity is prone to become infected. For many weeks there will probably be a profuse, purulent and irritating discharge from the anus and from the post-anal stab wound, if such exists. This discharge responds but slowly to irrigations and other treatment. If the anal canal is laid open at the end of the operation or during convalescence, it allows the discharge to drain away more freely, but the mucosa of the anal canal prolapses, which may be quite annoying to the patient. A further objection to the Hartmann operation is that the remaining stump of the rectum and anal canal may occasionally be the site of another carcinoma (Milligan, 1948).

If the original Hartmann operation is performed for a tumour of the upper third of the rectum or of the recto-sigmoid region so that the lower rectal stump consists of the greater part of the rectum, then it is possible to close the upper end of the rectum and to prevent the develop-

ment of infection in the pelvic cavity. The indications for this operation are limited to those patients who have a tumour of the upper third of the rectum or of the recto-sigmoid region, and who would be unable to withstand a combined radical operation or a restorative resection. If necessary, a resectable tumour as high as this may often be dealt with by a limited Paul-Mikulicz excision after the rectum has been mobilized from the sacrum. It may occasionally be possible to employ a Hartmann operation as the first stage of a restorative resection of a recto-sigmoid tumour, and then to perform the second stage when the general condition has improved sufficiently; but such a procedure is rarely indicated.

Tumour Resectable, No Apparent Distant Metastases, and General Condition Good.

It is in the group of patients in whom the growth is mobile, in whom there is no evidence of distant metastases, and in whom the general condition is good, that one looks for most of the patients who will survive for five years or more; but it is also with this group of patients that there is the greatest argument as to the place of restorative, reconstructive or sphincter-preserving operations. The crux of the matter would seem to be how large, if any, is the chance of cure that is lost with the restorative resections.

Restorative Resections.

Despite numerous ingenious attempts, no way has yet been found of making a functioning sphincter for an abdominal colostomy, and because of this, considerable attention has been directed to operations that are called "restorative" or "reconstructive".[1] Most patients with an abdominal colostomy are able to keep it clean, well regulated and inoffensive with relatively little trouble (Dukes, 1947), and they consider the colostomy a small price to pay for the chance of being cured of cancer. But, in the very senile patient, in the mentally confused patient, or in the patient who is slowly dying and is not in hospital, the care of a colostomy is quite a different matter. There are undoubted æsthetic objections to an abdominal colostomy; but an attempt to conceal the colostomy in the perineum has little to recommend it. If, as is often stated, a perineal colostomy presents few difficulties, then one is left wondering why patients who have not suffered from a carcinoma of the rectum, but who have lost control over the anal sphincters, need be incontinent of fæces. There should be little difference between them and patients with perineal colostomies.

An important point that should be mentioned in any discussion on restorative resections is the length of the rectum. According to Cunningham's "Text-Book of Anatomy" the rectum begins at the level of the third sacral vertebra. Thus, tumours situated above this level should not be classed with tumours of the rectum. When a tumour is as high as that, the problem of treatment is different from that of carcinoma of the rectum proper, and there should be little difficulty in performing a resection and anastomosis; but it is not to such cases that this paper refers.

The decision as to whether a combined radical operation must be employed to eradicate the malignant growth or to have a chance of doing so, or whether it may be possible to perform a restorative resection without submitting the patient to any unjustifiable risks, may sometimes be made as a result of the clinical examination. In other cases, the decision must be deferred until after the abdomen is explored.

The occasional downward spread of the malignant disease has been advanced as an argument against restorative resections (Miles, 1931); but when such downward spread is present, it is due to retrograde extension of the tumour down veins or lymphatics that are extensively invaded, and in such a case it is improbable that any operation would eradicate the malignant disease. Similarly, spread of the tumour to the paracolic glands occurs only when there is extensive invasion of the lymphatics.

Lateral spread of the malignant growth by means of the lymphatics running in the fascia of the *levator ani* muscle probably occurs only when the lower edge of the tumour is within 10 centimetres of the anal margin; but when the tumour is so low in the bowel, a restorative resection should be reserved for use only under certain well-defined circumstances, in which there are exceptional reasons for avoiding a colostomy.

It may, therefore, be stated that a restorative resection of the rectum is indicated and justified (Wilson, 1949) as an attempted curative procedure for the treatment of a carcinoma of the rectum when the following criteria are fulfilled: (i) when a single mobile carcinoma is present, which is relatively small when compared with the size of the pelvis, and the lower edge of which is situated 10 or more[1] centimetres from the anal margin; (ii) when the colon and its vessels and mesentery are sufficiently long; (iii) when the patient is in good general condition; (iv) when the patient has control over the anal sphincters; (v) when there is no evidence of diverticulitis or of chronic ulcerative colitis; (vi) when the surgeon and team are experienced in the treatment of carcinoma of the rectum by other methods; (vii) when the necessary instruments are available, especially if the patient is large and obese (Wilson, 1949); (viii) when certain points in technique are observed.

The points in technique to be observed are as follows. (i) The operation and resuscitation must be so carried out that there is practically no difference in the operative mortality rates of the restorative resections and of the combined radical operations. (ii) The same lymphatic field must be removed as in a combined radical operation. To ensure this it is necessary that ligation of the inferior mesenteric pedicle be performed as high as possible early in the course of the operation, and that the dissection in the pelvis be as wide as usual. (iii) The possibility of subsequent local recurrences must be reduced as far as possible. This may be best ensured by the following measures: (*a*) fulguration of the surface of the tumour at the commencement of the operation; (*b*) the application of the clamps to the bowel as early in the course of the operation as possible; (*c*) irrigation of the lumen of the bowel with a solution of 1 in 2000 perchloride of mercury before and after the application of the clamp; (*d*) division of the bowel with a diathermy knife; (*e*) the removal of at least three centimetres of apparently normal bowel below the growth; (*f*) the restriction of restorative resections to suitable cases. (In Wangensteen's series of 22 patients (1945), whom he had submitted to an intra-abdominal resection and anastomosis, five developed local recurrences; but all these five patients had large, fixed, low-lying lesions, and it would seem that they were originally more suitable for combined radical operations than for restorative resections.)

After a restorative resection it is of paramount importance that regular rectal examinations be performed so that a local recurrence may be detected without delay.

A restorative resection may also be indicated under conditions that are not ideal if the patient refuses to submit to a permanent colostomy, if he would be unable to manage it himself because of his poor mental state, or if repeated biopsies show no sign of malignant disease, though the clinical diagnosis is that of a carcinoma of the rectum. In the presence of a few hepatic, peritoneal or inguinal metastases a restorative resection should, as has been mentioned above, be performed whenever possible, even if, in doing so, it is necessary to limit the extent of excision of the inferior mesenteric lymph glands.

Types of Restorative Resections.

The possible types of restorative resections that may be performed on the rectum include (i) intraabdominal resection and anastomosis, (ii) high and low "pull

[1] The term "conservative" is better avoided when these operations are described.

[1] This distance is the length of the bowel between the lower edge of the tumour and the anal margin after any prolapse of the tumour has been reduced and after the rectum has been mobilized from above.

through" types of abdomino-anal excisions, (iii) abdomino-sacral excision and suture, (iv) sacral excision and suture and (v) vagino-perineal excision and suture.

Despite many attempts to revive them (Best, 1948; Mahorner, 1946), sacral excision and suture, abdomino-sacral excision and suture, vagino-perineal excision and suture, and the high "pull through" types of abdomino-anal excisions are no longer commonly used in England and North America; yet, even with their high incidence of post-operative complications, they are still popular with many of the French surgeons (d'Allaines, 1946).

In this paper the names of the surgeons usually associated with these various operations are avoided, for it is difficult to determine which surgeon has the prior claim to each procedure, and some of the names are associated with more than one procedure.

Abdomino-Sacral Excision and Suture.

The most frequent complications of abdomino-sacral excision and suture are post-anal and recto-vaginal fistulæ. The latter type is especially likely to appear if the vagina is damaged or if portion of it is devitalized during the operation.

If this operation is performed, it should always be preceded by a colostomy, and if a fistula develops the colostomy should be retained until the fistula has healed and the perirectal inflammation has apparently subsided. Even then, the fistula is prone to recur when the colostomy is closed and fæces are again directed to the rectum. Such a recurrent fistula may close spontaneously, or it may again be necessary to divert the fæcal stream by a colostomy and to attempt later to close the fistula by a local operation. If the fistula persists for some time the track may have to be cauterized to prevent the skin from growing down and meeting the mucosa. Sometimes, when the fistula persists despite treatment, the fæcal discharge gradually ceases and is replaced by a mucoid discharge. Occasionally an obvious ischio-rectal infection precedes the appearance of the fistula.

Stricture formation is likely to occur at the site of the anastomosis, and as a result of this and of the perirectal scarring due to the infection, subsequent control over the bowel may be imperfect.

The final result after an abdomino-sacral excision and suture is often as shown diagrammatically in Figure I.

This operation was devised in the days when, because of the great danger and frequency of peritonitis, it was wiser to avoid an intraabdominal resection and anastomosis; but that procedure is now possible with a low operative mortality rate, and the abdomino-sacral excision has been superseded.

Sacral Excision and Suture and Vagino-Perineal Excision and Suture.

The same complications may occur after the operations of sacral excision and suture and vagino-perineal excision and suture as after an abdomino-sacral excision and suture, except that the fistula is more likely to enter the vagina after the vagino-perineal procedure. Because of these complications and also because only a limited reaction is possible, they are no longer used by most proctologists.

Abdomino-Anal Excisions of the High "Pull Through" Type.

If abdomino-anal excisions of the high "pull through" type are performed by means of an abdominal dissection alone, then a stricture is the most frequent complication. Some such strictures respond slowly to repeated dilatation and proctotomy, whereas others prove to be intractable and require a colostomy. If the procedure includes a perineal or a sacral dissection, then in addition to the high incidence of strictures post-operative fistulæ will also be common. A high "pull through" operation may be followed by the development of an abscess at the anastomosis, but this abscess usually bursts into the bowel.

Because of the high incidence of post-operative complications, and because the conditions necessary for the performance of one of these procedures are essentially the same as those for the performance of an intraabdominal resection and anastomosis, the high "pull through" type of abdomino-anal excision probably has no place in the modern treatment of carcinoma of the rectum.

Intraabdominal, Intrapelvic or Anterior Resection and Anastomosis.

In previous decades the operation of intraabdominal, intrapelvic or anterior resection and anastomosis has been tried by many surgeons for the treatment of carcinomata of the recto-sigmoid region; but the operative mortality rate was so high that the procedure was usually abandoned. More recently, the development of chemotherapy, improved anæsthesia, improved methods of resuscitation and improved surgical technique have resulted in a reduction of the post-operative mortality and morbidity rates, and this operation has been revived for the treatment of carcinomata of the recto-sigmoid region and is now also used for the treatment of carcinomata of the upper half of the rectum (Dixon, 1939 and 1944; Fallis, 1943; Wangensteen, 1945).

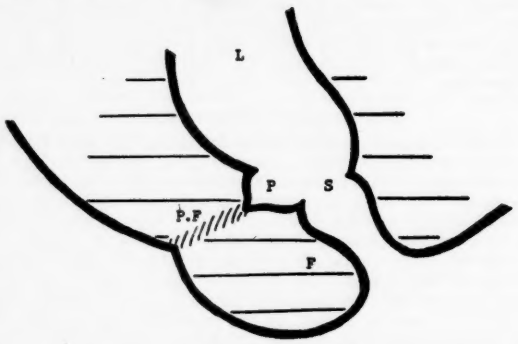

FIGURE I.

F, perirectal fibrosis, which interferes with the function of the anal sphincters. L, lumen of the bowel. P, pocket where portion of the suture line has separated. P.F., scar tissue at the site of the potential fistula. S, stricture.

This procedure is more difficult technically than Miles's abdomino-perineal excision, and it should be used only by surgeons well versed in other methods of excision of the rectum. For its use the general condition of the patient must be good. If correctly performed it permits as wide an excision of the superior hæmorrhoidal and inferior mesenteric lymph glands as do the combined radical operations, and usually it does not cause impotence. It should not, however, be performed for the treatment of a carcinoma of the rectum, the lower edge of which is less than 10 centimetres from the anal margin; for if it is, it will be followed by a high incidence of post-operative fistulæ and of local recurrences. Its use is also contra-indicated in cases in which the tumour is very large and is resectable only with great difficulty, or in which, because of senility or because of some other reason, there is interference with the function of the anal sphincters.

The specimen from a case in which an intraabdominal resection and anastomosis procedure was contraindicated is illustrated in Figure II. This patient was a frail old man of seventy-eight years, but with Mr. R. J. Malcolm it was possible to perform a synchronous combined excision even though the growth had to be dissected off the base of the bladder, and even though it was necessary to resect a loop of ileum. He would not have survived a restorative procedure.

The development of a local recurrence after intra-abdominal resection and anastomosis or after any other restorative resection makes a combined radical operation imperative.

Unless there is a stricture, impaction of fæces, or considerable perirectal fibrosis which interferes with the function of the anal sphincters, this operation does not

cause incontinence of fæces; but after this and other restorative resections of the rectum some patients have an increase in the number of bowel actions per day, and that is not surprising. Because the rectum is removed the patient receives little warning of the state of fullness of the terminal part of the bowel until the fæces have come in contact with the anal mucosa; he then feels that he must empty his bowels immediately.

Abdomino-Anal Excisions of the Low "Pull Through" Type.

Maunsell's Operation. — Maunsell's operation was described by Maunsell in 1892, and it appears to have been one of the first "combined" operations on the rectum. In recent years this operation has been advocated for selected cases by Lloyd-Davies. It consists essentially in mobilizing the rectum from above, causing the tumour and the rectum to prolapse through the dilated anus, amputating the prolapsed portion, and restoring the continuity of the bowel by suture as is done with other recto-sigmoidectomies for the treatment of rectal prolapse. This procedure obviates the need for making a difficult anastomosis in the depths of the pelvis. The suture line is below the peritoneum; and any temporary fistula will drain into the bowel and will not become external. Maunsell did not divide the inferior mesenteric vessels from above, but this is advisable as long as the apparent limit of viability of the bowel is checked before the tumour is made to prolapse and if it is checked again afterwards.

FIGURE II.

The chief indication for the use of the Maunsell operation now seems to be in the treatment of patients with a small mobile carcinoma, the lower edge of which is within 10 centimetres of the anal margin, whose general condition is good, whose colon and vessels and mesentery are sufficiently long for the tumour to be made to prolapse through the anus without difficulty and without affecting the viability of the colon, and who refuse to permit a permanent colostomy to be performed or who would be unable to manage a colostomy themselves. The complications after this operation are similar to those found after a recto-sigmoidectomy for rectal prolapse—namely, impaction of fæces, separation of the suture line, perirectal infection, persistent granulation tissue at the suture line, and stricture formation. Maunsell's operation was modified by Weir (1901) so that the bowel was not made to prolapse till after the carcinoma had been removed; but in a case in which that is possible an intraabdominal resection and anastomosis procedure may be performed and is to be preferred.

Babcock-Bacon Operation of Abdomino-Perineal Procto-Sigmoidectomy.—The Babcock-Bacon operation (Babcock, 1932; Bacon, 1945) is a low "pull through" abdomino-anal procedure; but except in a few clinics it is seldom used in England and North America, since many patients retain little or no control over the anal sphincters and are no better off than if they had a perineal colostomy. Even those patients who seem to have good control over their bowels after this operation often feel a lack of confidence unless a pad is worn, and there is almost always poor control over the passage of flatus and of semi-solid and liquid fæces. The impaired control after this operation is mainly due to the fact that the pubo-rectalis sling of the *levator ani* muscle and the external sphincter are damaged, but it is aggravated by the perirectal fibrosis and by the frequency of the bowel actions due to the loss of the rectum. After the Babcock-Bacon procedure it is essential for the patient to regulate his diet and to avoid aperients.

For the patient with a carcinoma within 10 centimetres of the anal margin who refuses to have a permanent colostomy, but is intelligent enough to show the requisite interest in the regulation of his bowels without being too "bowel conscious", this operation has a place; but it is believed that it is only a small place and the Maunsell operation is to be preferred in such cases whenever possible. This conclusion differs considerably from the recommendations of Bacon (1946), who advises that his operation be used in cases in which the carcinoma is located more than eight centimetres from the anal margin, and according to his figures the carcinoma is so situated in 80·9% of cases.

After a Babcock-Bacon procedure infection may occur in the pelvic cavity, and union between the anal canal and the colon may be slow. Such infection is most likely to follow an operation in which blood clot is allowed to remain in the pelvic cavity. Because of the frequency of such an infection a colostomy (proximal to the sigmoid colon) should always accompany this operation. At the end of the operation at least two inches of viable bowel should protrude through the anus; and for this reason a longer colon, vessels and mesentery are required than with intraabdominal resection and anastomosis. During convalescence a stricture may develop and repeated dilatation or proctotomy may be necessary; while, in other cases, mucosal prolapse and a mucous discharge may annoy the patient.

Multiple Stage Procedures.

In these days of shortages of hospital beds and nursing staff the increased length of stay in hospital necessitated by a restorative resection may be a cause of worry to hospital authorities, but to the patient it is of much less importance.

Most patients are willing to submit to the extra discomfort and to the extra time in hospital of the multiple-stage procedures of preliminary colostomy, resection of the rectum, closure of the colostomy (if these procedures are all considered necessary and if they do not increase the mortality rate) and perhaps also to the treatment of post-operative complications, if, by so doing, they avoid a permanent colostomy and retain control over their bowels. On the other hand, the extra time and operations will not often be considered justified if subsequently the control over the bowels is not perfect, or if the patient lives only for a few months after the completion of the multiple stage procedure.

In the presence of intestinal obstruction of any stage or degree, a colostomy should always be performed and the bowel allowed to recover its vitality and to overcome any infection in its wall before a restorative resection is contemplated. The importance of defunctioning the colon and rectum prior to the resection has been stressed by Devine (1935); but such defunctioning, when it is indicated, is now usually obtained by a simple colostomy. Shortening of the colon distal to the colostomy between the time of the colostomy and of the resection is likely to occur only in patients in whom an intestinal obstruction exists, and is not a valid argument against the use of a preliminary colostomy.

In the absence of intestinal obstruction and if the appropriate chemotherapeutic agents have been exhibited, a preliminary colostomy need rarely be performed prior to a restorative resection. Instead, the colostomy should usually be performed at the time of the resection and it will then act just as efficiently as a safeguard in reducing the severity of any post-operative reactions or complications. Nevertheless, if towards the end of the operation the general condition is found to be deteriorating, then it is usually wiser to omit the colostomy than to prolong the operation. If a colostomy has not been performed prior to or at the time of the restorative resection, it is still not too late to perform one if a severe pelvic or peritoneal infection develops.

LOCAL METHODS OF TREATMENT OF CARCINOMA OF THE RECTUM.

If it was possible to determine the extent of spread of a tumour prior to operation, a local operation would be all that would be needed for most of the "A" and for some of the "B" cases. Even in the absence of such knowledge, one of the local procedures remains the method of choice in certain cases.

In some cases in which localized and low-grade malignant changes have occurred in a tumour which was previously benign, which is pedunculated, which is easily accessible from the anus and which shows no evidence of extrarectal spread, local excision or recto-sigmoidectomy may be indicated. Such a case is, unfortunately, rarely found. Sometimes it is possible to palpate a ridge of malignant tissue extending upwards from the primary tumour, and sometimes an enlarged meso-rectal lymph gland is palpable; but usually there is, of course, no way of determining the presence or absence of extrarectal spread.

In the treatment of patients whose mental condition is poor, or who, against advice, refuse to permit a radical operation and colostomy, local excision and recto-sigmoidectomy also have a place when the tumour, although relatively small and accessible, would not ordinarily be considered suitable for such treatment.

On the other hand, when a large, deeply ulcerated tumour prolapses easily through the anus, the malignant cells have probably already spread to the meso-rectal lymph glands at least, and such a tumour should be removed only by a recto-sigmoidectomy if there is a special reason for avoiding a more major operation.

COMBINED RADICAL EXCISIONS OF THE RECTUM.

If the tumour is resectable, if there are no apparent distant metastases, if the general condition is good, and if it is considered that the patient is not suitable for a restorative resection, then a combined radical operation is the procedure of choice. The combined radical operations usually employed are the abdomino-perineal excision (Miles, 1908, 1944), the perineo-abdominal excision (Gabriel, 1934, 1948) and the synchronous combined excision (Kirschner, 1934; Devine, 1937; Lloyd-Davies, 1939; Turner, 1947); but there is no unanimity of opinion as to their respective merits. There is also no agreement as to the place of two-stage operations in such cases. The choice of the type of combined radical operation to be used in these cases seems to depend mainly on the greater experience of the surgeon with one of the procedures than with the others.

The Abdomino-Perineal Operation of Miles.

The abdomino-perineal operation of Miles is still the most widely used of the combined radical operations; but it has two major disadvantages, for it is necessary to divide the colon in the peritoneal cavity (which, however it is performed, must be regarded as undesirable), and it necessitates the closure of the pelvic peritoneum over the bowel and the tumour. This closure may be facilitated by excising part of the bowel, but this also is undesirable. If it is necessary to resect another viscus along with the rectum, then it is probable that considerable difficulty will be experienced with the closure of the pelvic floor over the specimen, and in these cases an abdomino-perineal excision is unquestionably inferior to the synchronous combined excision.

An abdomino-perineal excision is indicated in some of the cases in which there is a complicating ischio-rectal infection with or without spread of the malignant disease to the ischio-rectal fossa. In the presence of such an infection it may be difficult or impossible on clinical examination to determine how far the malignant disease has spread; but in some such cases an excision of the rectum *plus* a wide excision of the tissues of the ischio-rectal fossa may completely eradicate the malignant tissue. It is usually taught that such cases have a hopeless prognosis, but this is by no means true. If a tuberculous anal fistula is present, such a fistula should first be excised with a diathermy knife before the excision of the rectum is commenced.

The Perineo-Abdominal Excision.

The perineo-abdominal excision avoids the two main disadvantages of the abdomino-perineal excision. If the general condition of the patient is good and the carcinoma is resectable and mobile, but for some reason a restorative resection is contraindicated, the perineo-abdominal excision is the operation of choice. If, under similar circumstances, the tumour is not mobile and there is no malignant infiltration of another viscus, then a perineo-abdominal excision is often a most satisfactory procedure. In patients who are short and fat the perineo-abdominal excision usually presents less difficulty than does the abdomino-perineal excision.

The abdomino-perineal and the perineo-abdominal excisions, as usually performed, require turning of the patient with its attendant disadvantages; but if the operation is performed with the patient in the lithotomy-Trendelenburg position (Lloyd-Davies, 1939), this turning of the patient may be avoided.

Synchronous Combined Excision.

On theoretical grounds the synchronous combined excision of the rectum might be expected to be always superior to the abdomino-perineal and to the perineo-abdominal excisions. There is no doubt that when performed by two surgeons experienced in resections of the rectum this procedure permits the removal of many tumours on the borderline of resectability which would otherwise be "inoperable". The synchronous combined excision is the operation of choice in most cases in which it is expected that considerable difficulties will be experienced during the operation, and it would seem that it offers the best means of obtaining the maximum possible resectability rate for carcinomata of the rectum. Although the removal of the rectum in such borderline cases will often be only palliative, it is, nevertheless, frequently worth while.

If the tumour fills the pelvis and even if there are no malignant or inflammatory adhesions, then it will be difficult to carry out an abdomino-perineal or a perineo-abdominal excision, and a synchronous combined excision is to be preferred. If a carcinoma of the rectum is complicated by extensive inflammatory adhesions to another viscus or by an internal fistula, then, if the tumour is resectable, the synchronous combined excision is the operation of choice. In cases of carcinoma of the rectum in which the rectum may be easily removed, the synchronous combined excision lends itself more readily than does either the abdomino-perineal or the perineo-abdominal excision to the instruction of surgeons less experienced in excision of the rectum and to their obtaining the necessary practice to become proficient.

It has been said that one of the main advantages of the synchronous combined method of excision of the rectum is that it may be used in cases in which the general condition of the patient is poor; but twice the operative trauma in half the time is not necessarily advantageous or desirable, and in cases in which the general condition is poor a perineal excision, a Hartmann operation or even a local excision will give superior survival rates. The synchronous combined excision is certainly not the opera-

tion to be employed if both surgeons are inexperienced with other methods of excision of the rectum. Other disadvantages of the synchronous combined excision are that it requires two teams of surgeon, assistant and operating theatre staff, and that until the theatre staff is well organized considerable time will be taken in placing the patient in position. These, however, are no real disadvantages, since excision of the rectum should be performed only when such facilities are available.

SUMMARY.

The treatment of carcinoma of the rectum may be summarized as follows.

1. Expectant treatment is employed if (i) operation is refused, or (ii) if the patient's general condition is too poor for any operation, or (iii) ascites or jaundice due to metastases is present.

2. When the tumour is not resectable, owing to extreme local fixity, to numerous hepatic or peritoneal metastases, or to an extremely poor general condition of the patient, then a colostomy is indicated only if there is also (i) intestinal obstruction, or (ii) profuse hæmorrhage or discharge, or (iii) internal or extensive external fistulæ.

3. When the tumour is resectable, preliminary colostomy is indicated only if (i) acute intestinal obstruction is present, or (ii) localized perirectal abscess is present, or (iii) there are extensive perirectal inflammatory adhesions, or (iv) if the patient is in poor general condition and it is intended to perform a perineal excision of the rectum, or (v) ischio-rectal infection is present, or (vi) internal or extensive external fistulæ are present.

4. When the tumour is resectable but a few distant metastases are present, resection is indicated, for the following reasons: (i) it limits the pain, hæmorrhage and discharge; (ii) there may be a mistake in the recognition of metastases; (iii) hepatic or inguinal metastases may sometimes be successfully resected; (iv) the patient retains more hope of cure; (v) after the ulcerated primary tumour has been excised, life may be prolonged for several years; (vi) it prevents the formation of abscesses and fistulæ. In these cases the resection should be of a restorative or local procedure whenever possible.

5. When the tumour is resectable and there are no apparent distant metastases, but the general condition is poor, (i) if the tumour is in the upper third of the rectum, an extended Hartmann operation is indicated, or (ii) if the tumour is in the lower two-thirds of the rectum, a two-stage perineal excision is usually indicated, or a local procedure if the tumour is small and accessible.

6. When the tumour is resectable, there are no apparent distant metastases and the patient is in good general condition, treatment is as follows. (i) If the tumour is small and more than 10 centimetres from the anal margin, intra-abdominal resection and anastomosis are indicated when technically possible. (ii) If the tumour is small and less than 10 centimetres from the anal margin and a colostomy is refused or would be unmanageable by the patient, a Maunsell or Babcock-Bacon type of abdomino-anal excision or local procedure is indicated when technically possible. (iii) If the patient is not suitable for a restorative resection, the following conditions apply: (*a*) if the tumour is mobile, a perineo-abdominal excision is indicated; (*b*) if the tumour is not mobile, a perineo-abdominal or a synchronous combined excision is indicated, the latter if the tumour is very large and fills the pelvis, or if there is any doubt as to the resectability of the tumour, or if another viscus is involved; (*c*) if an ischio-rectal infection or an external anal fistula is present, an abdomino-perineal, a two-stage Lahey excision or a two-stage perineal excision is indicated; (*d*) if an internal fistula is present, a synchronous combined excision is indicated.

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SOME DIFFICULTIES IN THE INTERPRETATION OF HÆMATOLOGICAL DATA, WITH PARTICULAR REFERENCE TO THE ESTIMATION OF CAPILLARY FRAGILITY.

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INVESTIGATIONS into circulatory changes in diphtheria involved the estimation of capillary fragility, so that attention was directed to the theoretical implications of this test. The purpose of this paper is to discuss methods of estimating capillary fragility and to consider difficulties in the interpretation of results. A solution to some of these difficulties is offered and extended to a wider group of enumeration data frequently encountered in hæmatological practice.

Difference in Methods.

The choice of occlusion pressure varies considerably with different authors. Göthlin (1937) advocates occlusion at a pressure of 35 millimetres of mercury and an hour later repeats the test at a pressure of 50 millimetres of mercury. In assessing his results, he multiplies the 35 millimetres reading by two and adds the product to the 50 millimetre reading. Beaser, Rudy and Seligman (1944)

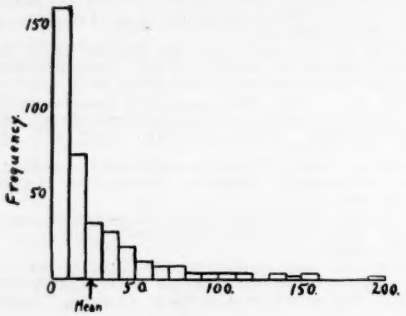

FIGURE I.
Petechiæ.

use a pressure of 80 millimetres of mercury and Wright and Lilienfield (1936) apply occlusion at a pressure halfway between systolic and diastolic blood pressures. No reason is given by Göthlin for deciding that the effect of the 50 millimetre pressure is twice that of the 35 millimetre pressure.

The factors determining choice of occlusion pressure are, firstly, that the pressure should be below the systolic blood pressure, as complete arterial occlusion produces virtually no petechiæ. Secondly, the pressure should be such that a reasonable number of petechiæ appear in a reasonable time—the longer the period of occlusion and the larger the area examined, the lower the pressure necessary. As the test is an uncomfortable one and is frequently applied to sick patients, shortness of time is an advantage, so that the highest pressure short of arterial occlusion would seem to be indicated. If a high standard pressure is used, an occasional patient will be found to have a systolic blood pressure below the decided standard, so that it is probably better to apply occlusion halfway between systolic and diastolic pressures.

It will be shown later that the number of petechiæ varies directly as the occlusion pressure, so that occlusion pressure should be recorded as a concomitant measurement. If it is found in any investigation that there is much variability in occlusion pressure, regression coefficients can then be determined and corrections applied to bring all results to a constant occlusion pressure.

Again, the period of occlusion varies with different authors, fifteen minutes being the most common duration. As was mentioned above, this may be a source of difficulty when patients are ill and restless, and provided the occlusion pressure is reasonably high, five minutes' occlusion will be found to produce an adequate number of petechiæ in pathological conditions and a reasonable range in normal subjects. There is an additional theoretical reason for shortening the time, in that the effect of anoxæmia is thereby limited.

The site chosen for counting petechiæ is not of great importance. The looser the skin, the larger and more readily discernible the petechiæ; but with this exception

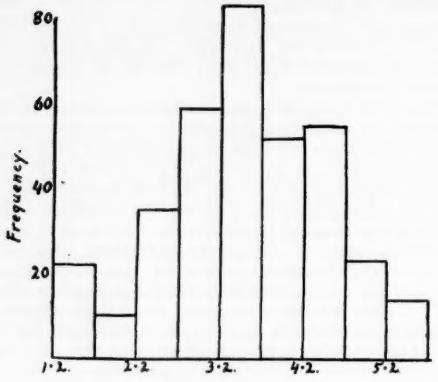

FIGURE II.
Petechial index.

it matters little which particular area is chosen, provided that it is comparatively hairless, there being no relation between the number of petechiæ and the distance from the site of occlusion. The area should be large enough to be representative, but not so large that counting becomes tedious.

Assistance in counting petechiæ is afforded by expressing the blood from the part with a glass slide. There seems to be no advantage in using a lens to observe results (Göthlin), as there is no limit to the size of lens that

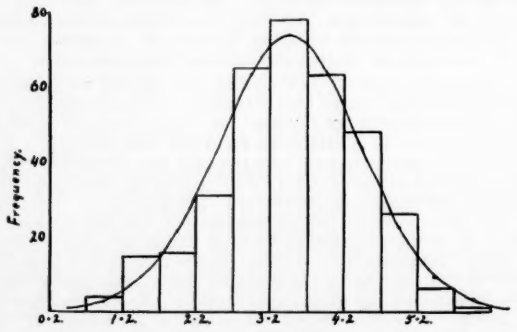

FIGURE III.
Petechial index corrected for pressure.

may be used, and equal results can be obtained by enlarging the area observed. Illumination is important in that it should be standardized (Bell, Lazarus and Munro); but with this proviso there is no more advantage in increasing illumination than in improving visual acuity by the use of a lens.

Method Used.

The method used in the present investigation was virtually that of Wright and Lilienfield (1936). Venous return was occluded for a period of five minutes above the elbow at a pressure halfway between systolic and

diastolic blood pressures. The arm was then elevated for a fixed period of five minutes, a circular area of three centimetres diameter was marked on the volar aspect of the forearm in the loose tissue just below the flexure, blood was expressed with a glass slide and the petechiæ were counted. Counting was assisted by the use of a standard three-volt focusing torch held six inches from the site of observation, the area of focus being approximately that of the area observed.

Skewness of Results.

The test was applied on 354 occasions to 69 cases of diphtheria, and the distribution of results is shown in Table I and Figure I. On examination of these values, the lack of symmetry is obvious. The mean of the distribution is shown in Figure I by an arrow, and it can be seen that as a single value, for summarizing the data, it is inadequate. This skewness was also remarked by Bell, Lazarus and Munro (1940), who point out that the mode is probably a better descriptive statistic than the mean. Beaser, Rudy and Seligman (1944) also realized the inappropriateness of means in describing these data,

TABLE I.

Comparison between Observed Distributions of Petechiæ in 354 Cases of Diphtheria with that of a Negative Binomial Distribution and a Poisson Distribution.

Petechiæ.	Observed Frequency.	Frequency Expected from Distribution of Greenwood and Yule (Negative Binomial).	Frequency Expected from Poisson Distribution.
0—	160	163·35	54·55
10—	73	63·53	102·02
20—	32	37·57	95·39
30—	27	24·74	59·43
40—	18	17·13	27·80
50—	10	12·21	10·40
60—	7	8·87	3·24
70—	7	6·53	0·87
80—	3	4·85	
90—	3	3·63	
100—	3	2·73	
110—	3	2·07	
120—	0	1·57	
130—	3	1·20	0·30
140—	1	0·92	
150—	3	0·70	
160—	0		
170—	0	2·40	
180—	0		
190+	1		
Totals ..	354	354	354

and in assessing their results used a method independent of form. This method does not make full use of the data.

All of us use means or averages to describe and summarize material we have collected, and confidence to do so is derived from the fact that much of our material is distributed symmetrically about the mean in what is known as a "normal" form—for example, mean cell diameter. An example of a normal curve is shown in the smooth curve of Figure III.

Because of the frequency of occurrence of the normal form in Nature and because of the comparative ease of its mathematical treatment, the vast majority of methods of statistical analysis used in practice are based on normal theory. Moderate departures from normality fortunately affect the results of analysis very little, but distributions so abnormal as the one obtained in this investigation would lead to serious error if treated as normal (for example, the correlation between positive and negative pressure methods—Bell, Lazarus, Munro and Scarborough, 1942). Before any statistical study of this material is made, it therefore becomes imperative to find some means of transforming the original data to a more normal form. To effect this transformation it is necessary first to obtain a mathematical description of the form of distribution of the original material.

On theoretical grounds, the distribution was thought to be that of a negative binomial (see statistical considerations), and comparison of the observed results with those derived from this standard distribution is shown in Table I. It will be seen that the theoretical distribution gives a close approximation to the observed values.

For confirmation, the figures of Bell, Lazarus and Munro (1940) were examined. These authors were interested in determining normal values for capillary fragility, using Göthlin's method, but excluding the 35 millimetres of mercury estimation. To commence with, they used an 80 watt lamp for illumination, but after examining 80 patients they became concerned at the high number of zero counts and changed to a 400 watt lamp. Examination of their first results shows a close approximation to the negative binomial distribution (Table II), and gives reasonable confirmation of the general applicability of this formula to estimation of capillary fragility. On the other hand, their second and larger series (Table II) gives a poor fit; but inspection of the individual contributions to χ^2 shows that the discrepancies are largely explained by an insufficient number of zeros and an excessive number of cases in which three petechiæ were found. This result suggests that, in the second series, subjects showing no petechiæ were examined more thoroughly than other members of the series, and emphasizes the fact that the test is not entirely objective.

TABLE II.

Comparison of Distribution of Normal Petechial Counts of Bell, Lazarus and Munro, using Illumination from an 80-Watt Lamp and a 400-Watt Lamp, with that Expected from the Theoretical Distribution of Greenwood and Yule (Negative Binomial).

Petechiæ.	80-Watt Lamp.		400-Watt Lamp.		χ^2.
	Observed Frequency.	Expected Frequency.	Observed Frequency.	Expected Frequency.	
0	48	50·5	39	52·3	3·38
1	14	12·2	62	59·1	0·14
2	7	6·2	61	53·4	1·08
3	4	3·7	59	44·3	4·88
4	3	2·3	41	35·0	1·03
5	2	1·5	20	26·9	1·77
6	1	1·0	17	20·3	0·53
7	1		10	15·1	1·72
8			7	11·1	1·51
9		2·6	6	8·1	0·54
10			5	5·8	0·11
11+			19	14·6	1·32
Total ..	80	80	346	346	18·01

Transformation to a More Symmetrical Distribution.

Once our material has been described mathematically, it is comparatively simple to derive a transformation to the normal form. Bartlett (1947) in a recent paper has given the appropriate transformation for a negative binomial. This was applied to each individual observation, and the resultant distribution is shown in Figure II.

It will be seen that the distribution is much more symmetrical and is a reasonable approximation to the normal form. The material is now in a suitable form for analysis.

Individual transformed observations were then compared on the basis of their occlusion pressure, and as would be expected, a significant relationship between occlusion pressure and petechial count was found (Table III). Individual values were therefore corrected to a constant occlusion pressure and the final distribution is shown in Figure III. A normal curve is superimposed, and it will be seen that the distribution does not differ significantly from the normal form.

To summarize: data concerning the petechial changes in diphtheria were obtained, examination showed the changes to be distributed in a form not amenable to ordinary statistical treatment, a theoretical distribution (negative binomial) was found to fit the material, and

TABLE III.
Correlation between Petechial Indices and Occlusion Pressure.

Petechial Index.	Pressure in Millimetres of Mercury.													Total.
	75-	80-	85-	90-	95-	100-	105-	110-	115-	120-	125-	130-	135-	
5·2 to 5·69	1	—	—	1	3	2	1	3	2	—	1	—	—	14
4·7 to 5·19	—	—	—	—	8	7	5	1	1	1	—	—	—	23
4·2 to 4·69	—	3	2	7	12	16	6	3	1	4	—	—	1	55
3·7 to 4·19	1	1	7	8	14	5	5	7	4	—	—	—	—	52
3·2 to 3·69	1	7	8	17	16	17	8	3	3	2	1	—	—	83
2·7 to 3·19	1	6	11	11	10	11	5	1	3	—	—	—	—	59
2·2 to 2·69	2	7	4	6	6	4	4	—	2	—	—	—	—	35
1·7 to 2·19	1	0	1	2	4	1	1	—	—	—	—	—	—	10
1·2 to 1·69	—	4	5	2	4	4	2	1	—	—	—	—	—	22
Total ..	7	28	38	54	77	67	37	19	16	7	2	—	1	353

once this had been obtained, mathematical transformation to a normal form became possible. A source of variation in the test (occlusion pressure) was found to be significant, and corrections were applied to exclude this source of variation, with the result that the material is now distributed in a form capable of adequate statistical analysis.

The two sources of variation were inherent in the method used to obtain these data and therefore could be excluded without effect on the extrinsic causes of variation, the study of which is the purpose of the investigation.

These procedures are of general application. Data should always be studied for similar abnormalities and techniques for intrinsic sources of variation before the material is submitted to analysis. Naturally different distributions will require different transformations.

TABLE IV.
Distribution of Megakaryocytes in the Bone Marrow of Subjects Suffering from Purpura, and of Controls (Diggs and Hewlett, 1948).

Megakaryocytes per 10,000 Cells.	Purpura Frequency.		Control Frequency.	
	Observed.	Expected.	Observed.	Expected.
0 to 4·9	2	3·2 } 8·7	5	6·9
5	7	5·5 }	12	10·9
10	6	6·1	14	10·7
15	6	5·6	6	8·3
20	4	4·6	6	5·6
25	4	3·5	3	3·4
30	2	2·5	2	2·0
35	0	1·7	1	1·1
40	2	1·0	0	0·6
45	2	0·8	0	0·3
50	0 }	1·5	1 }	0·2
55	1 }		0 }	
Totals ..	36	36	50	50

Further Application of the Negative Binomial Distribution.

On theoretical grounds it would appear that the negative binomial distribution should have a wide application in enumeration data, specifically when the frequency of occurrence of an event is rare in relation to the total number of observations, these observations being made on variable or non-homogeneous material. Such circumstances occur particularly in hæmatology, in which cells are counted and totals of individual cells are expressed as ratios of the whole.

In examination of the bone marrow, one of the rarest cells found normally is the megakaryocyte—the precursor of platelets in the peripheral blood. It is theoretically important to decide whether there is any alteration in the relative number of these cells in conditions in which platelets are reduced in number in the peripheral blood. Accordingly various investigators have compared counts of these cells in conditions in which the number of platelets in the peripheral blood is reduced with conditions in which there is no such reduction. The most recent of these comparisons is by Diggs and Hewlett (1948), who give sufficient protocols to determine the distribution of the counts in different groups. Their results in idiopathic purpura and controls are shown in Table IV with the negative binomial distribution for comparison in each group. It will be seen that the fit is reasonable in both cases.

Examination of the distribution of counts of eosinophile cells—another comparatively rare type of cell—shows a similar compatibility with the negative binomial, further emphasizing the more general applicability of the distribution.

Summary.

1. Positive pressure tests for capillary fragility have been discussed.

2. A method has been described.

TABLE V.
Distribution of Petechiæ in Repeated Counts on a Single Subject.

Petechiæ.	Observed Frequency.			Expected Frequency from Poisson Distribution.
	Left Arm.	Right Arm.	Total.	
0	6	6	12	7·9
1	9	10	19	18·3
2	8	10	18	21·2
3	6	7	13	16·3
4	5	2	7	9·4
5	4	2	6	4·4
6	1	2	3	1·7
7	1	0	1	0·6
8+	0	1	1	0·2
Totals ..	40	40	80	80

3. The results of applying this method to cases of diphtheria are given and the skewness of the distribution is emphasized.

4. A theoretical distribution has been found to describe the results, and transformations to a form more amenable to ordinary statistical treatment have been shown.

5. The general principles of such procedures have been emphasized.

6. Wider applications of the negative binomial distribution in hæmatology have been suggested and shown.

Statistical Considerations.

Capillary fragility is assessed by counting petechiæ in a fixed area under standardized conditions. The area examined is very large compared with that of the individual petechiæ, and the test is therefore analogous to that found in counting erythrocytes in a hæmocytometer chamber. These circumstances are appropriate for the development of a distribution of Poisson form, in that an event (the finding of petechiæ) is unlikely, but a

sufficient number of observations (a large area examined) are made to obtain a number of events. It is known that counts in a hæmocytometer chamber are distributed in the Poisson manner, and this is used as a test for adequate mixing and dispersal of the cells in the chamber.

The counting of petechiæ in different subjects differs from the counting of cells in the squares of a hæmocytometer chamber, in that the latter is composed of a population with a constant mean, whereas in the former the mean is varying from individual to individual or in the same individual at different times. The data on petechiæ are comparable with the counting of one small square in each of 80 different hæmocytometers, each hæmocytometer being supplied from different persons with varying degrees of anæmia.

On the other hand, repeated petechial counts on the same person at approximately the same time should be distributed in the Poisson form. To test this, 40 areas 1·5 centimetres in diameter were marked on each forearm of a subject—a total of 80 areas. The veins of both arms were occluded for five minutes at a pressure of 100 millimetres of mercury, and the petechiæ were counted in each area. The number of areas containing 0, 1, 2 *et cetera*

TABLE VI.

Petechiæ.	Frequency.[1]
0	$n\left(\frac{c}{c+1}\right)^p$
1	$n\left(\frac{c}{c+1}\right)^p \cdot \frac{p}{(c+1)}$
2	$n\left(\frac{c}{c+1}\right)^p \cdot \frac{p}{(c+1)} \cdot \frac{p+1}{2(c+1)}$
3	$n\left(\frac{c}{c+1}\right)^p \cdot \frac{p}{(c+1)} \cdot \frac{p+1}{2(c+1)} \cdot \frac{p+2}{3(c+1)}$
Et cetera	*Et cetera*

[1] Where $\bar{x}=\frac{p}{c}$ and $s^2=\frac{p}{c}+\frac{p}{c^2}$ and $\bar{x}$ is the mean, s^2 is the variance and n is the total number of observations.

petechiæ are shown in Table V. The standard χ^2 test here reveals no significant difference between the distribution for the two forearms and shows that the total distribution is consistent with that of a Poisson form. This experiment also emphasizes the lack of importance of the site selected for counting petechiæ.

The appropriateness of the Poisson distribution in a single subject should be compared with its failure to fit the data from cases of diphtheria (Table I). The distribution required appears to be that of a Poisson form with enhanced variance.

Greenwood and Yule (1920) experienced a similar problem when investigating accident-proneness amongst munition workers, and from similar arguments derived a distribution which fitted their data. This distribution was found to be that of a negative binomial, and on this basis they were able to show that the number of occurrences of an event should be distributed as in Table VI. Comparison of this distribution with results in cases of diphtheria gives a close fit (Figure I).

Recently Bartlett (1947) has shown that negative binomial distributions can be converted to a statistically more amenable form by the use of hyperbolic functions. His suggested transformation is $y = 2\sqrt{r}\ ar\sin h\sqrt{\frac{x}{r}}$, where x is the original variate and y the transformed variate; r can be derived from the formula for the variance of the observed distribution $s^2 = \bar{x} + \frac{\bar{x}^2}{r}$, where s is the variance and $\bar{x}$ is the mean of the observed distribution.

The constants p and c in Table III are used for convenience in fitting the distribution to observed values. They are related to the formula for the variance of the negative binomial: $p = r$ and $c = \frac{r}{\bar{x}}$.

Each individual value was accordingly converted to this new form, henceforth called "petechial index", and the results are shown in Figure II. It will be seen that the resulting distribution is much more symmetrical, and in addition the variance is divorced from the mean, thereby permitting the use of methods of variance analysis and correlation which would have been fraught with considerable doubt if applied to the original data.

On examination of the occlusion pressures used on different subjects, a wide range was seen to be covered. Accordingly a correlation table was constructed (Table III), and the significant value of 0·295 was obtained for correlation between occlusion pressures and petechial indices. A linear regression equation was determined: $y = p - 0{\cdot}028\ (x - 98{\cdot}6)$, where y is the adjusted petechial index, p is the unadjusted index and x is the occlusion pressure.

TABLE VII.

Comparison between the Distribution of Corrected Petechia Indices and that Expected from the Normal Form.

Corrected Petechial Index.	Frequency.	
	Observed.	Expected.
−0·6	—	1·0
0·7 to 1·1	4	2·4
1·2 to 1·6	15	8·6
1·7 to 2·1	16	21·8
2·2 to 2·6	31	42·1
2·7 to 3·1	65	63·1
3·2 to 3·6	78	72·2
3·7 to 4·1	63	63·8
4·2 to 4·6	48	43·0
4·7 to 5·1	26	22·3
5·2 to 5·6	6	9·1
5·7 to 6·1	1	2·6
6·2+	—	1·0
Total	353	353·0

Each individual index was corrected for occlusion pressure by means of the above-mentioned formula, and the final distribution is shown in Figure III. It will be seen from this and from Table VII that it approximates very closely to the normal form.

Acknowledgement.

I wish to thank Maurice H. Belz, Esquire, Associate Professor of Statistics, University of Melbourne, for calling my attention to Bartlett's work and for helpful criticism of parts of this paper.

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Reports of Cases.

OBTURATOR HERNIA: A CASE REPORT.

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(From the Department of Surgery, The Royal North Shore Hospital of Sydney.)

SINCE obturator hernia was first reported in 1724 in France (Saleeby, 1944), only 400-odd cases have been recorded in the literature (Desmond and Hutter, 1948).

The anatomy of the parts determines the frequency of hernial types and their liability to strangulation. Inguinal hernia, because of its yielding boundaries, is more common than femoral hernia. However, the latter is more apt to become strangulated because of the unyielding ligamentous structures on three sides of its neck.

Obturator hernia is rare because of the nature of its fibro-osseous neck, which also almost always causes strangulation (Anson, McCormack and Cleveland, 1950). These remarks are borne out by figures from The Royal North Shore Hospital of Sydney for the period from January, 1928, to December, 1949. During this time there were 1046 cases of inguinal hernia of which 92 (8·8%) were strangulated, 121 of umbilical hernia of which seven (5·7%) were strangulated, and 110 of femoral hernia of which 50 (45·5%) were strangulated. However, only one case of obturator hernia was recorded and it was incarcerated. (These percentages agree closely with those given by the American, McLaughlin, in 1949.)

A strangulated obturator hernia usually presents itself as an acute internal intestinal obstruction. During this same period, in addition to this one case of incarcerated obturator hernia, there were 280 cases of acute intestinal obstruction due to other intraabdominal causes.

Clinical Record.

The patient, a female, aged sixty years, was admitted to The Royal North Shore Hospital with acute intestinal obstruction of four days' duration. As the patient was deaf and very ill, the history was difficult to elicit. She stated that she had been constipated for four days and had had severe cramping pains in the upper part of the abdomen. An enema, administered two hours before her admission to hospital, had made her pass a small formed stool mixed with some fresh blood. After this, some greenish fluid was vomited for the first time since her illness began.

Examination showed the patient to be a sick, confused, somewhat obese woman, whose tongue was red and dry. The pulse was normal and the rate was 100 per minute. The respiratory rate was 14 per minute. The temperature was 98·4° F. The systolic blood pressure was 150 millimetres of mercury and the diastolic pressure 100 millimetres. Inspection of the abdomen disclosed generalized distension, more particularly of the lower part of the abdomen. There was no visible peristalsis. No tenderness or rigidity was found on palpation. Auscultation revealed a "silent abdomen". The hernial orifices were examined and no abnormalities were found. All other systems were normal. Examination of the urine revealed no abnormal constituents. A plain radiograph of the abdomen revealed distended loops of small bowel with fluid levels, but the point of obstruction could not be localized.

The diagnosis of late acute intestinal obstruction was made, the exact cause being undetermined.

Operation was performed some six hours later, when dehydration had been overcome by venocylsis and the intestines had been decompressed by Wangensteen's suction. The anæsthetic used was a combination of "Pentothal" and cyclopropane aided by "Tubarine". The abdomen was explored through a right lower paramedian incision. A small amount of free blood-stained fluid was present in the peritoneal cavity. Cultural examination later showed that it was sterile. By following collapsed small bowel a small right obturator hernia was found with a knuckle of ileum caught in it. The circumference of the bowel was not completely involved, so that a complete obstruction had not been present at that point (Richter's hernia). However, at the time of operation, all the small bowel above the lesion was considerably dilated and paralysed. By gentle dilation of the obturator canal with the finger, the bowel was released. Inspection of the affected loop revealed a small knuckle of bowel, seven-eighths of whose circumference was thick and red with extravasated blood. As the serosal arteries on the antimesenteric border soon commenced to pulsate, it was realized that the bowel was still viable (Ficarra, 1949). However, at one spot the bowel wall was compressed to paper thinness so that it had to be oversewn. As the patient was so ill, no attempt was made to remove the hernial sac. The abdomen was then closed in the usual manner.

After the operation, in spite of Wangensteen suction and intravenous fluid therapy (including administration of blood), the patient never regained consciousness, and she died five days later in coma.

Autopsy revealed that the small bowel was still dilated down to the affected loop. The suture line was intact and there was no leakage from the bowel, which was healthy. There was no peritonitis. A small right obturator hernia was present with no contents. All other organs were normal except the kidneys. In these the cortex was narrow and the surfaces were rough and granular. Microscopic examination of the kidneys revealed old chronic nephritis. In addition, there was acute tubular degeneration affecting mainly the convoluted tubules. The cells lining these tubules were separated from one another, and their nuclei no longer retained the nuclear stain. Most of the cells in the loops of Henle, the collecting tubules and the cells of the glomeruli still stained properly.

Comment.

The diagnosis was therefore acute intestinal obstruction due to an incarcerated Richter's type of obturator hernia. This was complicated by paralytic ileus caused by the prolonged incarceration.

This case illustrates the danger of late intestinal obstruction. Even though strangulation had not occurred and the obstruction was relieved, death ensued, possibly from uræmia, but more probably from toxins released from the obstructed bowel (Smith, 1948). The blood count and serum protein findings were normal after operation, but the blood urea level rose to 120 milligrammes *per centum* before death. Adequate amounts of normal urine were passed daily with an adequate salt output (Marriott, 1947).

This lesion is rarely diagnosed before operation (one case in four), and hence the mortality has been high (151 of 228 patients died—Watson, 1948). However, one should be able to diagnose acute intestinal obstruction early and be prepared to deal with whatever is found. With regard to this patient, however, her attending physician was not called until late in the illness, and he immediately sent her to hospital.

It was difficult to elicit a correct history from this patient, as she was very ill and deaf. Her relations were not able to be interviewed until after the operation. They then stated that the patient had had several attacks of abdominal pain in the previous three years (as in Van Swalenburg's case—1919). They said also that at the commencement of this last illness for the first time she had complained of pain in the inner aspect of the right thigh radiating to the knee. This pain was aggravated by straining (the Howship-Romberg syndrome). Had this information been elicited before operation, the diagnosis would have been suspected. As it was, there was no tenderness or swelling in the right femoral triangle, nor was the hip joint held flexed.

Most authors stress the fact that these patients are elderly females who are wasted (Saleeby, 1944; Desmond

and Hutter, 1948); but this patient was somewhat obese with no history of recent loss of weight.

There is no need to discuss the anatomy here, as this has been done by Wakeley (1939) and Aird (1949).

Acknowledgements.

I wish to thank the General Medical Superintendent of The Royal North Shore Hospital, Dr. Wallace Freeborn, for permission to publish this case report. I am indebted to Dr. C. Graham, morbid anatomist to the Kolling Institute of Research, for the autopsy report.

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A CASE OF CHRONIC MANIA TREATED WITH LITHIUM CITRATE AND TERMINATING FATALLY.

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LITHIUM CITRATE, advocated by Cade as a sedative in states of psychotic excitement, was given to two patients in the Mental Hospital, Ballarat. One of these patients died, and her case is considered to be worth recording.

Clinical Record.

Mrs. M.N., aged fifty-seven years, first became mentally disordered at the age of fifty years, and had been constantly maniacal for the past three years. Her physical health was satisfactory.

On December 19, 1949, the administration of lithium citrate, 20 grains three times daily, was commenced. The lithium citrate was dissolved in water flavoured with syrup of orange. A week later she was a little quieter and showed no signs of toxæmia; but on the following day, the nurses, who had been given a list of the known toxæmic symptoms, reported her to be vomiting, confused and ataxic. The administration of the lithium citrate was discontinued immediately. Less than twenty-four hours later she had a major epileptiform seizure. During the following two days she remained confused, but took fluids and nourishment well, and the degree of ataxia diminished.

At the commencement of the fifth day from the onset of signs of toxæmia she again had an epileptiform seizure, and an hour later a series of five seizures occurred over a period of one hour. Two drachms of paraldehyde were given by means of an intranasal tube and there were no further seizures, but a state of deep coma ensued.

To combat the coma and the severe circulatory failure which was present, the patient received during the next thirty-six hours nikethamide by intravenous injection, continuous oxygen inhalation by means of a B.L.B. mask, and saline by intranasal tube and *per rectum*. Her condition improved considerably, and by the end of the sixth day she responded to painful stimuli. Muscular hypotonus was constantly present.

Nasal feeding with milk, eggs, sodium chloride and vitamins was carried out thrice daily, and procaine penicillin, 100,000 units a day, was administered prophylactically. During the seventh, eighth and ninth days her condition varied between coma and semi-coma; the temperature remained in the vicinity of 100° F., while the pulse rate was from 112 to 130 per minute. Examination of the urine during this time revealed a moderate cloud of albumin, but no sugar was found to be present.

At the end of the ninth day the condition of her circulation deteriorated rapidly; the pulse became irregular and of poor volume, and the rate reached 150 per minute; the respiratory rate rose to 44 per minute, and the temperature was elevated to 105·5° F. The treatment which had previously produced improvement now failed, and she died.

Post-Mortem Findings.

The findings at post-mortem examination were essentially negative, and did not reveal the cause of death.

There were no signs of cerebral œdema, hæmorrhage or thrombosis, no evidence of pneumonia or of cardiovascular disease. The kidneys were macroscopically normal, although urine obtained *post mortem* contained a considerable amount of albumin.

Comment.

An excited female schizophrenic who received the same dose of lithium citrate during the same period became quieter, but showed no evidence of intolerance.

To the patient who died no more lithium citrate was given once the signs of toxæmia appeared, but she did not become comatose until after *status epilepticus* had developed four days later. In view of the continued comatose state, the possibility of a cerebro-vascular accident was then considered; but the autopsy disproved any such supposition. The only conclusion that could be arrived at was that death was due to the toxic effects of lithium citrate.

In his original article, Cade makes it quite clear that lithium citrate and carbonate can be toxic in the dose usually necessary for sedation of psychotic excitement. He also states that "if toxic symptoms develop, they disappear quickly—that is, in two to four days—when the drug is completely withdrawn". The case reported here would seem to indicate that recovery is not always certain.

In a recent unpublished communication, Cade has pointed out that "there is evidence that adequate or increased intake of sodium will protect against the toxic effects of the lithium ion".

No sodium was given to our two patients, and had we known of its protective action at that time, the degree of toxicity in the fatal case may not have been so severe.

It seems possible, however, that as a form of symptomatic treatment lithium citrate suffers from the grave disadvantage that the therapeutic dose is dangerously close to the lethal dose.

Summary.

1. A case of death resulting from the toxic effects of lithium citrate, therapeutically administered, is presented.

2. It is believed to be the first fatality from the use of lithium salts for sedation in states of psychotic excitement.

3. It is noteworthy that there was an interval of four days between the withdrawal of the drug and the onset of *status epilepticus* and coma, and that another five days elapsed before the patient died.

4. Attention is drawn to the fact that a sodium salt was not given with the lithium citrate in this case, and it has been pointed out subsequently that there is evidence that sodium decreases the toxic effects of the lithium ion.

5. In the absence of the protective action of sodium, the therapeutic and lethal doses of lithium may approximate too closely for safety.

Acknowledgement.

I wish to thank Dr. C. Farran-Ridge, medical superintendent of the Mental Hospital, Ballarat, for performing the autopsy on this patient and for permission to submit the report for publication.

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Reviews.

A YEAR BOOK OF UROLOGY.

UNDER the continued editorship of Oswald S. Lowsley, "The 1949 Year Book of Urology" maintains the high standard of its predecessors.[1] Prepared from literature received by its editor during the period from September, 1948, to October, 1949, it covers very satisfactorily the ground that might reasonably be considered within the ambit of urology. If there is a type of urological practice which warrants the gibing description of "plumbing", it accounts for only a limited section of the subject as the editor of this Year Book conceives it. General medical considerations and physiological principles are given an important place, a fact which makes the volume not only of greater value to urologists, but also of interest to physicians and others outside the specialty. On the other hand, surgical technique is by no means neglected. The material is arranged broadly as in the previous Year Book, the main subjects being general considerations (calculi, uræmia, anuria, infections and tumours), the kidney and adrenals, perinephric conditions, the ureter, the bladder, transurethral operations, the prostate, the genitalia, and gonorrhœa. In the section on the kidney and adrenals, the subsection on renal tuberculosis is removed and one on anomalies apears; in the section on the bladder, a new subsection on the neurogenic bladder is included, and the heading "infections" is replaced by "cystitis"; a subsection on surgical technique is added to the section on the prostate. The literature covered is wide and the selection of material judicious. Reference is made to a report of primary epithelioma of the male urethra by C. W. R. Price, of Perth. The make-up of the volume, as with all its companions, is beyond reproach, and its contents fulfil all that could be reasonably expected.

A YEAR BOOK OF OBSTETRICS AND GYNÆCOLOGY.

"THE 1949 YEAR BOOK OF OBSTETRICS AND GYNECOLOGY" contains few changes in its general plan from its predecessor.[2] Its standard is maintained under the continuing editorship of J. P. Greenhill. The only alteration in the arrangement of the material presented is in the transferring of the subject of ectopic pregnancy from the section on gynæcology to the section on obstetrics where it appears under the main heading of pregnancy. A wide selection of journals has been examined in the selection of abstracts, the journals covered being those received within the period from October, 1948, to August, 1949. At least two Australian papers have been included, one by W. M. Lemmon, of Melbourne, on the management of delayed response to artificial rupture of membranes as a method of inducing labour, and the other by J. W. Johnstone, of Melbourne, on ovulation in the sexual cycle and basal temperature patterns. Increased current interest is reflected in the considerable length of the sections devoted to certain subjects, for example, toxæmias of pregnancy, which continue to elude full understanding; Cæsarean section, which has become increasingly popular and to which the editor devotes one of the longest of his sparing editorial notes; infertility, in which much interest has been shown and a good deal of progress made; and malignant tumours, whose importance is perennial. Many other topics are referred to, and the editorial comment, if not lavish, is always helpful. Specialists in gynæcology and obstetrics and general practitioners who take an interest in these specialties will find much of interest in this year book.

[1] "The 1949 Year Book of Urology (September, 1948-October, 1949)", edited by Oswald S. Lowsley, M.D., F.A.C.S.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 5", pp. 452, with 62 illustrations. Price: $5.00.

[2] "The 1949 Year Book of Obstetrics and Gynecology (October, 1948-August, 1949)", edited by J. P. Greenhill, B.S., M.D., F.A.C.S.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 5", pp. 644, with 132 illustrations. Price: $4.50.

OXIDATION-REDUCTION POTENTIALS IN BACTERIOLOGY AND BIOCHEMISTRY.

BACTERIOLOGISTS AND BIOLOGISTS who want to familiarize themselves with the fundamentally important subject of oxidation-reduction processes and potentials will find the book by L. F. Hewitt a useful introduction.[1] The first chapter on the theory of oxidation-reduction potentials is particularly well written and lucid. Chapters on the practice of the measurements, on the subsidiary pH estimation and a final chapter on polarography complete the methodological part. The specialized chapters dealing with systems of biological interest, metabolic cycles and "chain" reactions, bacteriological applications, and chemotherapy and antibiotics are less satisfactory.

In his preface to this new edition the author states that the scope of the book has been broadened to include the discussion of "implications and effects of oxidation-reduction conditions in metabolic processes and living cells". A great variety of biochemical topics, some of which have only a loose connexion with the subject, is discussed, sometimes rather scantily. One feels that the broadening has been carried too far, and that a deeper penetration would have been preferable.

The wish to extend the subject to biological oxidation-reduction processes in general, instead of restricting the discussion to the potentials, is understandable. The potentials deal only with one, the thermodynamic, aspect of the processes. Thermodynamic treatment gives information on the problem in which direction a certain reaction will proceed, and what equilibrium it will reach; it fails to tell us anything about the rate of a thermodynamically possible reaction. As long as life lasts, equilibria are never reached, and the steady state in living cells depends on kinetic factors, particularly the enzymes. A separation of thermodynamic and kinetic aspects of biological oxidation-reduction processes must therefore necessarily remain unsatisfactory. The difficulties of presenting an integrated viewpoint are, however, great, and the time for it has probably not yet arrived. To state that the book fails in this respect is therefore no serious criticism.

The difficulties are occasionally stressed by the author, but not always fully recognized. One may doubt, for example, whether the lowering of electrode potentials in bacterial cultures is adequately explained by the reduction of hydrogen acceptors in the medium (apart from the question whether potentials measured in the presence of oxygen have any precise physicochemical meaning). The medium supplies hydrogen donors as well as hydrogen acceptors to the cells, and the transformation of electrode-inactive substances into electrode-active ones is, surely, more important. As long as we have no precise knowledge of the systems in the media to which the potentials are due, the observations remain interesting empirical data.

The chapter on systems of biological interest deals indiscriminately and rather haphazardly with oxidation-reduction systems of fundamental importance for energy metabolism (cytochromes, flavoproteins, coenzymes), with compounds which without being oxidation-reduction systems themselves play a role in oxidation-reduction processes (catalase, peroxidase), with compounds which are oxidation-reduction systems, but whose oxidation-reduction plays no major biological role (hæmoglobin/methæmoglobin), and with a variety of compounds whose role in oxidation-reduction processes is still unproven. The important publications of W. M. Clark on the potentials of the hæmochrome (hæmochromogen) systems, and those of Coryell and of Wyman *et alii* on those of the hæmoglobin/methæmoglobin system find no mention. The space devoted in the following chapter to the attempt to correlate and integrate the more important systems is only 12 pages.

The text is not free from a number of printing errors and inaccuracies. There are also examples of careless

[1] "Oxidation-Reduction Potentials in Bacteriology and Biochemistry", by L. F. Hewitt, Ph.D., B.Sc., F.R.I.C.; Sixth Edition; 1950. Edinburgh: E. and S. Livingstone, Limited. 9½" × 7½", pp. 228, with 44 illustrations. Price: 20s.

writing: "so that after n periods . . . the original lone bacterial cell will be 2n" (apart from the fact that it "will be" 2^n); or: "In view of the very different chemical constitution of the dyes it is hardly surprising that the potential should be the only factor in bacteriostasis" (where at least a "not" is missing before "the only factor").

The book is well printed and illustrated. In spite of its shortcomings, it provides an easily readable introduction to those who wish to acquire a general idea on what is involved in this subject.

LABORATORY TESTS IN DIAGNOSIS.

"CLINICAL DIAGNOSIS BY LABORATORY EXAMINATIONS" by John A. Kolmer has appeared in its second edition.[1] The title of the book appears to attach too much importance to the help that the laboratory can give in bedside diagnosis. However, the author explains in the introduction that he interprets "clinical" in relation to diagnosis as referring to the purpose rather than the place of the examination.

The book is set out in three parts. The first and largest part deals with the clinical interpretation of laboratory examinations. In each section it deals with the anatomical, physiological and pathological principles involved, and then the abnormalities found in various diseases. In each section there are also very comprehensive summaries of the clinical interpretations of the various laboratory examinations.

In the second part the author deals with the practical applications of laboratory examinations. The various groups of diseases are considered from ætiological and pathological aspects, and the relevant laboratory tests are discussed briefly. This part of the book is therefore the reverse of the first part; and the reader can use the first part of the book as an encyclopædia of interpretation of tests, and the second as an encyclopædia of indications for tests. It is a pity that there is no simple system of cross-references from the second to the first part. Although the index is comprehensive, difficulty was found in obtaining the maximum information on particular subjects.

The third part of the book deals with the technique of laboratory examinations, but in it the author aims at discussing only those likely to be used by students and practising physicians and surgeons.

The book covers the subject matter well and fairly completely. There is more detail than is normally required in a text-book for the student and practising doctor, but as a reference book the work is admirable. The matter is well set out and the illustrations are practical and helpful. In most respects it is quite up to date.

Criticism will be levelled in two respects. Firstly, there are certain important omissions or lack of emphasis. These include the Rh genotypes, the Race-Coombes test, the importance of culturing the tubercle bacillus, estimation of urinary chlorides in cases of water and salt depletion, and an "old-fashioned" concept of Simmonds's disease. Secondly, it is still considered that clinical medicine in the British tradition requires less emphasis on the laboratory and more on the bedside approach to diagnosis.

OPERATIVE OBSTETRICS.

THE fifth edition of "Operative Obstetrics", by J. M. Munro Kerr and J. Chassar Moir, is a work of outstanding merit, in which the problems of dystocia are critically surveyed and appropriate solutions presented.[2] The objective of the authors is to clarify "the means to be employed to prevent, or, if this is impossible, to anticipate, prepare for and deal with the complications and difficulties of parturition at the right time and in the right manner". This is the aim of every obstetrician and to him this book presents choice fruits from a wide experience; with its rich bibliography, ample illustrations and statistical and case records, it should win universal approval.

In the admirable chapter on occipito-posterior positions we find that the time for interference is (*a*) in the *primigravida*, when rotation to the front fails to occur after two hours of labour in the second stage, (*b*) in the *multipara*, after one hour under such a condition—it being assumed, of course, that the shape of the pelvis, as determined by radiography, does not contraindicate rotation. The discussion is exhaustive and excellent.

The techniques of normal and complicated breech delivery, including the Lovset manœuvre and its limitations, are beautifully described, and emphasis is placed on the personal experience of the obstetrician as being the principal factor governing the safety of mother and child, an aphorism which at once points to a simple means of reducing the existing 10% to 20% fœtal mortality.

Radiographic pelvimetry and cephalometry are briefly described, and it is rightly stressed that "Intrapartum radiography is one of the more valuable services of X ray", and also "the time has come when an obstetric hospital without radiographic facilities within easy reach of the labour ward is as great an anachronism as a heart hospital without an electrocardiograph".

The story of tumours complicating pregnancy makes attractive reading, surgical conservatism being completely outlawed, even to the extent of an advocacy of ovariotomy *plus* Cæsarean section when the tumour is discovered near term and not obstructing delivery.

Cæsarean section and the advantages of the lower segment operation are clearly presented, and in the well-balanced discussion on the hæmorrhages of late pregnancy few will challenge the statement in relation to *placenta prævia* that "version will always be the sheet anchor in remote places, but in an institution it will be the method of choice only where the gestation is less than thirty-four weeks, or where the child is dead or deformed". In severe concealed hæmorrhage preference is expressd for hysterectomy rather than Cæsarean section when the fœtus is dead.

Attention must be called to a few harmless errors: page 363, condilomata accumulata; page 410, hydromephrosis; page 520, uterine relaxation instead of retraction; page 631, vasicular mole; page 632, Phannensteil; again, while the numerous German references are well quoted, that on page 13 ill becomes a book which is destined for readers in many lands.

BIOMICROSCOPY OF THE EYE.

THE second volume of "Biomicroscopy of the Eye" completes Berliner's work on microscopy with the slit lamp.[1] Approximately seven hundred pages are devoted to normal and abnormal appearances of the iris, lens, vitreous and fundus. The book is sumptuously bound and lavishly illustrated in colour and monochrome.

The book is intended as an illustrated guide to the slit lamp, and the illustrations have been prepared and engraved with care. Each section is preceded by a description, often too brief, of the normal anatomy of the part under discussion. Scarcely more than a few lines are devoted to the morphology of the iris, one of the most interesting structures in the human body. There is no hint of the unusual embryological and anatomical implications of the *dilator pupillæ*, and little appreciation of the phenomena responsible for the normal appearances of the iris. For no obvious reason, Berliner attempts to replace the term "collarette" by "frill", and pupillary pigment border by "seam". Such an obtrusion of a too literal translation from the German betrays a fondness for a German form of expression in the English language which makes the text difficult to read. It is for this reason that the description of the zonule is so involved as to be almost unintelligible.

Although many of the illustrations are from the author's cases, the bulk necessary for this impressive-looking volume is gained by voluminous quotations chosen with little discrimination from the writings of other observers. An elaborate work of this nature calls for some attempt to explain the changes as seen by the slit lamp on an anatomical basis. There is little evidence of this, although there must have been many opportunities given to the author with the rich clinical material available to him in New York. It is disappointing to read that "we still are forced in most instances to make the diagnosis of a tuberculous process by inference or by exclusion", a remark which betrays little acquaintance with the post-mortem room.

[1] "Clinical Diagnosis by Laboratory Examinations", by John A. Kolmer, M.S., M.D., Dr.P.H., Sc.D., LL.D., L.H.D., F.A.C.P.; Second Edition; 1949. New York: Appleton-Century-Crofts, Incorporated 9½" × 6½", pp. 1244, with 93 illustrations. Price: $12.00.

[2] "Operative Obstetrics: A Guide to the Difficulties and Complications of Obstetric Practice", by J. M. Munro Kerr, LL.D., F.R.C.O.G. (Hon. Causa), M.D., F.R.F.P.S.G., and J. Chassar Moir, M.A., M.D., F.R.C.S.E., F.R.C.O.G.; Fifth Edition; 1949. London: Baillière, Tindall and Cox. 9½" × 6¼", pp. 950, with 390 illustrations. Price: £3 3s.

[1] "Biomicroscopy of the Eye: Slit Lamp Microscopy of the Living Eye", by M. L. Berliner, M.D.; Volume II; 1949. New York: Paul B. Hoeber, Incorporated. 10" × 6¾", pp. 831, with 202 illustrations. Price: two-volume set $50.00, Volume II alone $35.00.

The volume concludes with an account of the examination of the fundus with the slit lamp, a comparatively recent innovation which does not appear to add to any great extent to the information given by the ophthalmoscope.

Although sumptuously produced, the book fails in its purpose for lack of an adequate pathological perspective. It is unfortunate that the ophthalmologist too often watches the process of a disease without ever being able to elucidate its exact nature. In his impatience, he tends to lapse into unlicensed speculation and comes to resemble those Athenians whom Saint Paul castigated in the Areopagus. Like the rest of modern medicine, ophthalmology has still too many altars "To the unknown God".

THE LARYNX.

FOR over twenty years the name of Victor Negus has been associated with painstaking, original and authoritative observations upon the structure and functions of the larynx. The present work is a successor to his first great book, "The Mechanism of the Larynx", which has been out of print for a number of years. In "The Comparative Anatomy of the Larynx" Mr. Negus presents all the enduring material of his first work, greatly enriched by his continued observations in the meantime.[1] Further, by skilful condensation and reliance more upon illustration than word, the bulk of the volume is considerably reduced.

As the author points out, although most people associate the larynx with phonation, very many species in the animal kingdom have a larynx which is never used for vocal purposes. In this book he traces the evolution of the larynx and its associated mechanisms from fishes throughout the vertebrate scale up to man. On the way he points out many interesting structural and functional adaptations of value to the habits of individual species, such as the mechanism for closure in aquatic animals, the straight-through efficient system of tubing in fast-running ungulates and the laryngeal saccules of a number of the primates.

In a pleasantly philosophical manner Negus devotes an appendix to special consideration of the human larynx. He points out that the human has lost in respiratory efficiency by acquiring the upright posture, visual and cerebral dominance and the power of speech. The respiratory losses are introduced by the acute flexure of the cranio-vertebral axis, reduction in size of the epiglottis and soft palate and narrowing of the larynx. He also deduces from structural considerations that the ancestors of man were herbivorous—this opinion might well be contested by those who hold that man has risen from omnivorous animals and has retained that dietary character.

Altogether this is a valuable and delightful book, well produced and illustrated, and a contribution worthy to stand beside those of such surgeon-scientists as John Hunter, Charles Bell and Bland Sutton. The main defect is the absence of a bibliography, omitted because of considerations of space. While the omission is understandable, it certainly robs the work of a great deal of its value as a source of reference.

ACUTE LARYNGOTRACHEOBRONCHITIS.

NEFFSON'S monograph on the subject of laryngotracheobronchitis[2] is most welcome. Thirty years have passed since the medical profession was awakened to the realization that "croup" could be caused by infections other than diphtheria, but in spite of a growing literature there are still both confusion and argument about fundamental conceptions. Neffson's own interest dates from the beginning of the period. In this work, the first to be published on the subject, he discusses the vexed questions of nomenclature and ætiology, inclining to the opinion of Australian writers that it is basically a virus infection with secondary bacterial invasion. The whole book is well produced and well illustrated. Much of it is devoted to the detailed treatment of this alarming and dangerous disease, emphasis being laid upon the meticulous care required to keep the child's airway clear. This excellent monograph should find a place upon the library shelves of every children's hospital.

[1] "The Comparative Anatomy and Physiology of the Larynx", by V. E. Negus, M.S., F.R.C.S., with a foreword by Sir Arthur Keith; 1949. London: William Heinemann (Medical Books), Limited. 9¾" × 7½", pp. 256, with 191 illustrations. Price: 30s.

[2] "Acute Laryngotracheobronchitis", by A. Harry Neffson, M.D.; 1949. New York: Grune and Stratton. 8½" × 5½", pp. 112, with 16 illustrations. Price: $5.00.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Old Age: Some Practical Points in Geriatrics and Gerontology", by Trevor H. Howell, M.R.C.P. (Edinburgh); Second Edition; 1950. London: H. K. Lewis and Company, Limited. 8½" × 5½", pp. 116, with nine illustrations. Price: 10s. 6d.

Based on observations made at the Royal Hospital, Chelsea.

"An Elementary Course in Philosophy", by George Politzer (translated by Dr. G. P. O'Day, Melbourne); 1950. Sydney: Current Book Distributors. 6¾" × 4¼", pp. 216.

The author was a member of the French Communist Party who was shot by the Germans during the occupation of France.

"Medical Physics"; Editor-in-Chief, Otto Glasser, Ph.D., F.A.C.R.; Editorial Assistant, Jessie C. Tucker; Volume II; 1950. Chicago: The Year Book Publishers, Incorporated. 10½" × 7½", pp. 1254, with many illustrations. Price: $25.00.

The first volume was published in 1944.

"Asthma", by Clement Francis, M.A., M.B., B.Ch. (Cambridge); 1950. London: William Heinemann (Medical Books), Limited. 7¼" × 5", pp. 42, with a few illustrations. Price: 5s.

Includes special reference to nasal cauterization practised by the author's father.

"Proceedings of the Annual Meeting, 1949: British Medical Association"; 1950. London and Australia: Butterworth and Company (Publishers), Limited. 9¾" × 6¼", pp. 496, with 56 illustrations. Price: 34s.

The proceedings are arranged according to the various scientific sections of the meeting.

"Progressive Professional Nursing", by Mona E. Grey, S.R.N., S.C.M.; 1950. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 5", pp. 112. Price: 4s.

Describes the "modern structure of nursing with an appropriate historical background".

"On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life", by Charles Darwin, with a foreword by Dr. C. D. Darlington, F.R.S.; 1950. London: Watts and Company. 7¾" × 5¼", pp. 450. Price: 15s.

The first reprint of the first edition published on November 24, 1859.

"Current Therapy, 1950: Latest Approved Methods of Treatment for the Practising Physician", edited by Howard F. Conn, M.D.; 1950. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 10¼" × 8", pp. 770. Price: £4 15s.

Designed to bring to the practising physician authoritative information on the latest approved methods for the treatment of disease.

"A Manual of Cardiology", by Thomas J. Dry, M.A., M.B., Ch.B., M.S. in Medicine; Second Edition; 1950. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 7¼" × 5¼", pp. 368, with 97 illustrations. Price: 47s. 6d.

The author aims "to present . . . in as precise a form as possible the present-day concepts of cardiovascular disease".

"Mitchell-Nelson Textbook of Pediatrics", edited by Waldo E. Nelson, M.D.; 1950. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 10" × 7", pp. 1682, with 426 illustrations, some of them coloured. Price: £5 18s. 9d.

Written for undergraduate medical students, pædiatricians and general practitioners.

The Medical Journal of Australia

SATURDAY, AUGUST 12, 1950.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE PECKHAM EXPERIMENT IS ABANDONED.

For every individual, by furthering such favourable opportunities of education, service and leisure as shall enable him or her most perfectly to develop the body, mind and spirit: In all social life, whether domestic, industrial, or national, by securing a just environment. . . .

THESE words are printed opposite the title page of a book by I. H. Pearse, M.D., and L. H. Crocker, B.Sc., dealing with what has become known as "The Peckham Experiment", published in 1943 and reprinted in 1944. They relate what has been attempted at Peckham and their book will appeal to most thinking people in the community as describing a worthwhile objective. The knowledge that at Peckham something useful was being attempted in the sociological sphere gave rise to a comfortable feeling even in this part of the world and perhaps one of satisfaction, though most people were somewhat vague about the whole affair. Thus surprise, disappointment and uneasiness of mind have followed the announcement that the Health Centre at Peckham has been closed. Some insight is given by M. R. A. Chance, who contributes to *The Lancet* of April 15, 1950, an article entitled: "Where from Peckham."

From Pearse and Crocker's book we learn that the Pioneer Health Centre was established in 1926 in Queen's Road, Peckham, London. It was started by a group of non-medical people, all under thirty years of age, who believed that health was the factor of primary importance for human living. They "had only the vaguest notion of what they meant by 'health', but sensed that its secret lay with the infant and its early development". After advice had been sought from scientific persons, it was decided to establish a health service constituted on the pattern of a family club, with a periodical health overhaul for all its members and with certain ancillary services for children and parents. By the end of three years some 112 families, or 400 individuals, had joined, and all of them had presented themselves for periodical overhaul. It soon became apparent that while periodical health overhaul acted as an effective sieve for the detection of disease or disorder, it was ineffective as a health measure in the absence of "instruments of health"—it disregarded the environment of the family. It was held that the necessary "instruments of health" should provide conditions in and through which "the biological potentiality" of the family could find expression. It was decided to embark on a new and larger enterprise, one able to cater for 2000 families, in which the same consultative services as before were to be provided, and in which the member families "would find equipment for the exercise of capacities for which there was little or no possible outlet in the ordinary circumstances of their lives". Thus in 1935 the second stage took form, a social structure, built, not on the individual, but on the family. The club building, in other words the health centre, was a three-storied edifice capable of accommodating the leisure activities of 2000 families or 7500 individuals. In Pearse and Crocker's book there are 15 pages of photographs depicting the various activities of the club centre. There are pictures of children in gymnasia and swimming pools, at indoor games and at meals; there are pictures of the "family consultation"—the parents and child being interviewed by two efficient-looking persons, a man and a woman—and pictures of social activities of adults, dancing, at games and in the restaurant. It all looks jovial and friendly. The undertaking was designed to be self-supporting. A family paid a membership fee of one shilling a week and this brought in about £5000 a year. Another £5000 came from small charges for certain social activities—twopence for this and threepence for that. All types of family in the vicinity became members. Pearse and Crocker (they were writing in 1943) describe the medium as "science socialized" and add that the centre had shown itself to be a potent mechanism for the "democratisation" of knowledge and of action.

Chance, who was for some time on the staff of the Pioneer Health Centre in an advisory capacity, states that the closing of the centre has come as a shock to sympathetic and interested people, and adds that in the last decade it had become world famous as a social experiment. Visitors from abroad were directed to it from official quarters and a cinematograph film about it had been prepared by the Ministry of Information at a cost of £10,000. A week before its closure the centre was being televised. Chance states that it is the more necessary to discover why the centre has been closed since the value of its work has been a subject of controversy for a long time. "Scientists were quick to realise that the reporting of the scientific work lacked the standard of accuracy expected in scientific investigation, and most of them have therefore dismissed it as unworthy of further consideration. On the other hand it has continued to attract the attention of progressively minded scientists, and of administrators and social workers throughout the world." Chance states that over and over again visitors arrived full of enthusiasm, but left entirely mystified, unable to take back to their friends any clear idea of what was being done. At the same time Chance points out that the idea behind the centre contained several components which were essentially biological in

origin—that social behaviour is important, that the unit of study should be the family and not the individual, and that such a study requires a special environment. For this reason the venture can be regarded as "the first serious attempt to found sociological work upon a biological basis". Chance points out that there is always an interaction to be reckoned with between the insight gained through a particular activity and the further direction of this activity. At the centre's consultations the doctors are brought into close touch with the mind of each individual. "There are many aspects to the family consultation procedure and it is precisely the way in which this consultation brings together these various components which gives it a unique character." Chance reminds readers that in the social sphere the dependence of one person's behaviour on that of another is much greater than we are usually aware of, and that psychology teaches us that our behaviour towards other individuals is the most inflexible part of our character. The condition of membership that member-families should be prepared to consider, in consultation with the doctors, the full implications of the medical and physiological examinations, was right. Chance holds that technically the scientific investigations at the centre were mismanaged owing to a preoccupation with techniques whose validity had not previously been tested. Hence the results could be questioned on technical grounds and there was also "an inability to collaborate with scientists in other branches of knowledge". Chance thinks that for these reasons the results of the physiological investigations carried out at the centre have not found their place in scientific literature. Our author also makes some other indictments. The shortcomings of the centre were partly due to arbitrary methods of administration, "which the founders were unfortunately unable to do without", and there was noted also an arbitrariness with which members of the staff on occasion interfered with the activities of members. This arbitrariness is described as "startling" and it is to be noted that there was no set of rules for the running of the place. Chance's final statement is that there was a relative absence of intellectual and cultural activity "which must have struck anyone who stayed there longer than a day".

Chance cannot be said to have explained why the centre has been closed. Those who closed it may not have recognized the faults of "arbitrary methods of administration". They may not have recognized that the centre "fell short of its aim". Most critics will agree that an absence of intellectual and cultural activity was a serious gap; but this may not have had a determining influence on the closure. If nothing else, Chance has made suggestive assertions which would need to be carefully considered by any other authority or group of persons who contemplated the establishment of a health centre run on family and general sociological lines. Since the centre was being televised a week before its closure, it cannot, one would suppose, have undergone atrophy from disuse. Australian students of sociological medicine will probably not think that Chance has told the whole story of the closure of the Peckham Health Centre, and they will await further information. What they will want to know is whether the "experiment" has really failed.

Current Comment.

THE USE OF SEDIMENTED RED CELLS IN ERYTHROCYTOSIS FŒTALIS.

REFERENCE has been made in these pages to the use of exchange transfusions in the treatment of infants suffering from *erythrocytosis fœtalis*. This method has been used on the assumption that removal of an affected infant's blood will remove both damaged red cells and passively transferred antibodies, and thus hæmolysis will be arrested. Samuel Pennell, in an article describing the method of transfusion with sedimented red cells, points out that Levine, Davidsohn and others have emphasized that mothers with high pre-natal titre of Rh antibodies may give birth to Rh positive infants who do not develop severe erythrocytosis.[1] This immunity from serious blood disorder in these infants may exist even though Rh antibodies derived from the mother may be demonstrated free in their plasma, and also attached to their red cells. Wiener and others are quoted as showing that "blocking" Rh antibodies require an activator to produce agglutination of the red cells. This substance, known as "conglutin", has been demonstrated in adult plasma or serum, but not in that of the infant. It is even claimed that the addition of as little as one part of adult plasma to nine parts of serum derived from the umbilical blood of a baby will cause macroscopic agglutination of red cells on a slide. It has been estimated that 30 to 50 millilitres of adult whole blood may be enough to induce hæmolysis of sensitized red cells in an infant. Therefore it is suggested that the transfusion of adult whole blood might activate incomplete antibody present in the blood of an erythrocytotic baby and thus precipitate further hæmolysis. When exchange transfusion is used this factor might be a serious bar to the method, and Wiener and others have tried removal of half the adult plasma before infusion, replacing it by physiological saline. Instances of fatal erythrocytosis have been recorded in which exchange transfusion was the only method used, and in which massive necrosis of the liver was the most prominent feature of the autopsy findings. Pennell now records the results of 28 cases of antibody incompatibility in infants, 21 due to the Rh factor, and seven to the A B O group. The criteria for transfusion were: jaundice; anæmia with hæmoglobin value below 15 grammes *per centum*; the presence of more than 200 nucleated red cells per cubic millimetre; proof of the presence of anti-Rh agglutinins in the mother's blood, with an infant which is Rh positive and shows evidence of blocking antibodies attached to the red cells when the antiglobulin test was used; and finally the history. All these babies were treated with bank blood. Since bottles of each type of blood were always kept on hand on ice, there were always bottles available with thoroughly sedimented red cells, and as the bottle used had a long tube extending from the stopper to within half an inch of the bottom, it was simple to withdraw sedimented red cells. In breaking the vacuum of the flask care was taken to introduce the needle only into the depression in the stopper which led to the space above the fluid, so as to avoid disturbing the cells below. In this way 50 or 60 cubic centimetres of sedimented cells could be withdrawn and introduced into a vein in the infant's scalp or arm or ankle with a syringe. No difficulty was found in doing this without dilution of the cells. This method avoided the technical difficulties and delays in preparing washed red cells, and reduced the risk of contamination to a minimum. Pennell gives full information about the infants treated in this series, and compares his results with those reported by others. There were three deaths in his own series, a mortality rate comparing favourably with that reported after exchange transfusions. He points out particularly that the suggested quantity of red cells, 50 to 60 cubic centimetres, is sufficient to raise the hæmoglobin value of the infant's blood without imposing any load on its circulation. It is obvious also that

[1] *Blood*, February, 1950.

it reduces to the minimum the amount of plasma introduced, and therefore prevents any rise in the agglutinin titre of the baby's blood. No other diluent of extraneous nature, such as sodium citrate, is introduced. The simplicity of this manœuvre seems to commend it, a feature which contrasts with some aspects of the theoretical advances in knowledge concerning the Rh factor.

ELECTROCARDIOGRAPHIC STUDIES IN POLIOMYELITIS.

INFLAMMATORY CHANGES have been described during recent years in poliomyelitis, as well as other viral diseases. Electrocardiographic changes have also been described, though it does not follow that these bear any necessary relation to true inflammation. H. A. Bradford and L. L. Anderson have recorded the results of an electrocardiographic survey of patients suffering from poliomyelitis during an epidemic in Colorado in 1946.[1] In this outbreak 303 cases were observed, and a little over one-half of the patients had tracings taken. The authors quote Saphir and Wile, who have described infiltration of inflammatory cells and other changes in the hearts of six out of seven patients who died of the disease. No definite correlation could be established between the autopsy findings and the clinical picture, but it was of interest that the inflammatory changes were more striking in three patients who died suddenly. Electrocardiographic studies have been made previously by other workers. One series of 467 cases showed that the more obvious abnormalities were found in the more seriously ill patients. Some of these, such as disproportionate sinus tachycardia, could not be regarded as significant. It has been found that aberrations in the tracings were detected early in the attack, that they did not increase in degree and that they persisted for several weeks. Bradford and Alexander were not able to make serial studies of all the patients, for the outbreak was fulminating, most of the cases being observed during a period of six weeks. In 20 cases out of 155 definite electrocardiographic changes were found. No complicating factors such as pre-existing heart disease or drug administration were present. Very minor variations were disregarded. The abnormalities seen were sinus tachycardia, changes in the *T* waves, and wave patterns recognized as characteristic of ventricular strain, and of significant conduction disturbance. By contrast it should be stated that 135 patients were examined two months after recovery and no abnormalities of the heart tracings were found. Sinus tachycardia was not regarded as of much importance, especially in the younger children. Two patients who had signs of right ventricular strain in the electrocardiogram had bulbo-spinal forms of the disease, were very ill, and had pulmonary œdema. One of them succumbed. The authors attribute the ventricular strain here to respiratory paralysis, myocardial anoxia and obstruction of the pulmonary tree with thick mucus. They regard such findings as *T* wave changes and altered conduction in the junctional tissue as of toxic origin.

Attacking the problem from the histological point of view, they found few significant changes in the hearts of those who died from poliomyelitis. They admit, however, that if more sections had been studied, and had a special inquiry been made into this aspect, more abnormalities might have been discovered. Those who have examined the cardiac tissues for similar purposes will agree that great industry and care and much time and technical assistance are necessary for the adequate performance of this task.

The interpretation of these observations is beset with difficulty. Bradford and Anderson point out that electrocardiographic changes are sometimes recognized in such diseases as rheumatic fever, diphtheria, pneumonia, typhoid fever, typhus, influenza, brucellosis and *periarteritis nodosa*. The mention of the last-named brings with it a caution, for similar histological changes in various tissues of the body may be produced by toxic substances, such as some drugs known to call forth allergic reactions. We must also remember that it is practically certain that cellular infiltrations into the heart muscle, and other less discernible lesions, may occur in a reversible form in persons who make a successful recovery. With these points in mind, we are justified in asking ourselves what myocarditis is. Are we to accept a purely pathological diagnosis which can be made only after death, or do we dare to assert that certain temporary aberrations in the electrocardiogram are due to a true myocardial involvement? It is not in the least surprising that cardiac changes may occur in severe infective disease, but it would seem wise to view the whole clinical picture with discretion and judgement. It is not fair to the pathologist or the electrocardiographer to attribute judgements to them which they have not made; often, too, it is unfair to the patient.

[1] *Annals of Internal Medicine*, February, 1950.

ORGANIC PHOSPHORUS POISONING FROM HORTICULTURAL SPRAYS.

THE introduction of certain highly toxic organic phosphorus compounds into Victoria as sprays for fruit trees *et cetera* has prompted the Director of Agriculture of Victoria to write to the Victorian Branch of the British Medical Association and pass on certain essential facts for the information of the medical profession in Victoria. The facts appear to be of sufficient practical importance to be brought to the notice of the profession throughout Australia. Serious effects and a few fatalities have been reported in the literature overseas as a result of contact with organic phosphorus compounds that are actually on the market. It is important, therefore, to know the characteristic symptoms of poisoning and also the antidote, for there is fortunately an antidote. The toxic materials concerned are organic tetraphosphates and pyrophosphates (marketed under such trade names as "Hexone", "H.E.P.T.", "Demite", "Tetraphos" and "Tephos") and organic thiophosphates (marketed as "E605", "Paraphos", "Phosone" and "Parathion"). While all these materials are highly toxic, the thiophosphates appear to be the most troublesome group. Poisoning can occur as a result of inhalation, ingestion or absorption through the skin. Evidence of poisoning has occurred after handling or packing the concentrated materials, after spraying with diluted solutions and dusts, and after handling recently sprayed fruit. Symptoms and signs of poisoning are giddiness, headache, tightness of the chest, blurred vision, pin-point pupils, sweating, nausea, vomiting, diarrhœa, abdominal cramps, convulsions, semicoma and coma. Greatly increased salivary and bronchial secretion is common, simulating pulmonary œdema. Treatment consists primarily in the administration of relatively large doses of atropine—one-sixtieth to one-thirtieth of a grain. This is given preferably subcutaneously immediately the diagnosis is made and then every hour as required up to a total of three-tenths of a grain or until the pupils dilate. The patient should be watched carefully for a period of twenty-four or forty-eight hours, during which it may be necessary to give additional atropine to maintain a balance between its effects and the toxic effects of the poison. According to the information supplied by the Victorian Director of Agriculture, it is the consensus of opinion in America that the administration of atropine should be courageously continued when the patient remains in a definite state of poisoning due to the muscarinic action of the toxic material. Postural drainage and aspiration may be necessary if signs of pulmonary congestion are present, and the administration of oxygen may be required. Morphine should not be given. No mention is made of possible toxic effects on persons who handle or eat fruit at some more or less remote time subsequent to the use of the spray. The specific references to those who actually handle or use the sprays and to those who handle recently sprayed fruit seem to imply absence of more remote effects. It would be helpful to have more information on this point. Meantime we should be grateful to the Victorian Director of Agriculture for drawing attention to the general question and for supplying helpful practical information.

Abstracts from Medical Literature.

PATHOLOGY.

The Histogenesis of Uterine Myomata.

OTTO H. SCHWARZ AND SETH WISSNER (*American Journal of Obstetrics and Gynecology*, December, 1949) state that myomata commonly arise from small arterioles containing smooth muscle in their walls, small and large arteries, and both large and small veins. They feel that it is much more difficult to show evidence that they actually arise from muscle bundles; and although they made considerable effort to demonstrate lesions suggestive of this origin, they found none impressive enough for illustration. The very close relationship in most instances of small myomatous areas to the blood vessels makes it very difficult to account for muscle-fibre cell origin, because of the difficulty in determining landmarks. The authors found that the illustrations in the literature were meagre and mostly not clear, and almost no photographs were found; consequently they feel that no clear-cut illustrations have been presented to date. They do not question the fact that muscle-fibre origin may occur, as many careful observers have concluded, but they question very much that the uterine muscle fibre *per se* plays any great part in the development of myomata. They acknowledge that this origin may exist, but feel that the blood-vessel origin is the more common.

Angiogenesis and Lymphocytic Infiltration of Inflammatory Origin.

ELI MOSCHCOWITZ (*Archives of Pathology*, March, 1950) submits evidence that in a wide variety of chronic granulomata autochthonous formation of new blood vessels is the rule, and that it occurs in the course of a fibroblastic differentiation of the newly formed mesenchyme. This mesenchyme is formed primarily from lymphocytes that exude from blood vessels and to a lesser extent from fixed connective tissue cells which undergo a transformation. The mechanism of the angiogenesis represents a reversion to that which occurs in the embryo. The hyperplasia of the sinuses and the extramedullary blood formation in "congestive" splenomegaly are explainable in this interpretation. One of the functions of the lymphoid cell in chronic inflammation is its potentiality for being transformed to endothelium, and hence for angiogenesis. The newly formed vessels either persist or become destroyed. In the latter case the component cells revert to collagen and eventually to sclerotic connective tissue. The whole is viewed as part of the reparative process inherent in the concept of inflammation.

Pigment Patterns in Epithelial Tumours of the Skin.

BERNARD LENNOX (*The Journal of Pathology and Bacteriology*, October, 1949) describes how the pigmentation of a series of epithelial skin tumours has been examined by a modification of Masson's silver method. He states that of the squamous papillomata and rodent ulcers examined, 67% and 37% respectively contained melanin; squamous carcinoma alone of common epidermal tumours is regularly without it. Melanoblasts are demonstrable in pigmented tumours in nearly all cases studied; production of melanin by the epithelial cells of the tumours is considered improbable. In pigmented tumours the pigmentation may assume any of three patterns: (*a*) A small number of squamous papillomata retain the structure and type of pigmentation of normal skin. (*b*) Most squamous papillomata show melanoblasts along the basement membrane and little melanin in the epithelial cells. (*c*) Rodent ulcers and squamous papillomata of the *verruca senilis* type have their melanoblasts scattered through the cell groups, and their epithelial cells are uniformly and often heavily pigmented. Embryological and experimental evidence for the neural-crest origin of the melanoblast is summarized.

Extension of Primary Neoplasms of Bone to Bone Marrow.

JACKSON E. UPSHAW, JOHN R. MCDONALD AND RALPH K. GHORMLEY (*Surgery, Gynecology and Obstetrics*, December, 1949) state that direct extension is the usual method by which a primary bone sarcoma spreads in the bone marrow from its initial location in a long bone. Medullary extension from a primary bone sarcoma may occur without radiological evidence of its presence. Neoplastic medullary involvement may be found on microscopic examination for a considerable distance past any gross evidence of medullary extension in many cases of primary bone sarcoma. Of the primary bone neoplasms studied, Ewing's tumour exhibited the greatest tendency, osteogenic sarcoma the next greatest, and primary chondrosarcoma the least, to spread in the bone marrow. In this series, 45% of Ewing's tumours, 20% of osteogenic sarcomata, and none of the primary chondrosarcomata showed medullary extension for three inches or more past the limits of cortical involvement by the lesion. Of the predominant cell types of osteogenic sarcoma, the osteoblastic type exhibited the greatest tendency, the fibroblastic type the next greatest, and the chondroblastic type the least, to extend in the bone marrow. The author states that in osteogenic sarcoma, the higher the grade of malignancy, the greater the amount of medullary involvement that is likely to be found. In this study no medullary extension was found in cases of primary chondrosarcoma, regardless of grade of malignancy, and no attempt was made to grade malignancy in Ewing's tumours. The amount of medullary extension *per se* cannot be used as a basis for prognosis in osteogenic sarcoma; while in Ewing's tumours, with pronounced medullary involvement, the prognosis is distinctly worse. Apparently invasion of blood vessels and metastasis are as likely to occur in cases in which osteogenic sarcomata show no spread in bone marrow as in those in which pronounced medullary extension occurs past the confines of the cortical lesion. In Ewing's tumours, however, those which have a greater invasive tendency as reflected by increased medullary extension are more likely to invade blood vessels early and have caused undetected metastatic lesions at the time of surgery. In the treatment of primary bone sarcoma by amputation, microscopic examination of the bone marrow at the point of amputation should be mandatory in every case in which amputation is performed through the bone containing the lesion before the surgeon concludes that the amputation is proximal to the lesion. The recognition of malignant cells individually or in small clusters may be very difficult, and when any doubt exists, amputation should be performed at a higher level. In this study the inadequacy of radiological and gross methods of examination used alone for the detection of extension in the bone marrow was illustrated in the study of the survival rates among patients with osteogenic sarcomata. Microscopic examination of the bone marrow at the site of amputation was not routine in these cases. It was found that in the cases of osteogenic sarcoma in which amputation was proximal to the bone containing the lesion, results were superior to those in cases in which transection was carried out through the bone containing the lesion. One important cause of the poor results of amputation through the bone containing the lesion, as compared to the results of amputation above the affected bone, was failure to amputate proximal to the lesion, since the amputation occasionally was through an area of medullary extension which was undetected at the time of surgery.

The Pigmented Nævus.

HERBERT Z. LUND AND GODFREY DORR STOBBE (*The American Journal of Pathology*, November, 1949) state that there are progressive changes in the histological appearance of nævi throughout life. The features which change most noticeably are size, number of nævus cells, proliferation of cells in the epidermis and at the dermo-epidermal junction, number of mitotic figures, and presence of fibrils and nerve-like elements. In most instances, an approximate correlation of the histological appearance with the age of the patient can be made by an evaluation of these features. Judged from the transitions noted in the different age groups, nævus cells appear to differentiate slowly from foci of clear cells found in the epidermis and follicles and along sweat glands. Further differentiation, principally in adult life, leads to the formation of fusiform cells with fibrils, which in many instances resemble neurofibrils and tactile corpuscles. Such structures are therefore to be considered the final stage of differentiation of nævus cells, not the source of nævus cells. That the foci in the epidermis, follicles and sweat glands are the only source of nævus cells is favoured but not proved. There are exceptions to the general trend. Nævi of children may resemble those of early adult life. Nævi of adults, usually in the third and fourth decades, may resemble nævi of childhood. The latter exception is notable in regard to nævi of the hands and feet. However, in this series the trend of nævi in middle age in these sites is similar to the trend of nævi in general. Final conclusions must be based on a larger series. Junctional proliferation in nævi of adults does not in itself indicate melanoblastoma. There are an expected incidence and degree of such proliferation at various ages. Certain additional criteria must be fulfilled before a histological diagnosis of

melanoblastoma is warranted. In adults the occurrence of nævi that morphologically resemble those of childhood leads to the suspicion that they are incipient and growing, but clinical evidence obtained in this analysis of their duration and rate of growth is variable and conflicting, permitting no final conclusion. Evaluation must await further study. Nævi vary in appearance according to location. A notable modifying factor is the number of hair follicles and sweat glands in the various cutaneous sites. While most nævi have nævus cells in a superficial stratum beneath the epidermis, deeply placed nævus cells tend to have a perifollicular and periglandular distribution. Diffusely scattered, deeply placed nævus cells also occur.

MORPHOLOGY.

Appearance of Ossification Centres.

C. R. NOBACK *et alii* (*The Anatomical Record*, January, 1949) present data dealing with the influence of thyroxine, thiouracil, œstradiol and testosterone propionate on the time of appearance of certain ossification centres in the rat. On the basis of the effect of thyroxine and thiouracil, they concluded that the thyreoid gland had a role in influencing the time of appearance of ossification centres, but œstradiol and testosterone propionate appeared to have no effect.

Fine Structure of Skeletal Muscle.

D. C. PEASE AND R. F. BAKER (*The American Journal of Anatomy*, March, 1949) record a number of observations and conclusions concerned with the structure of mammalian skeletal muscle, frozen in liquid air and lyophilized at −72° C. Most of the observations were made with the electron microscope after use of a suitable sectioning technique. Muscle fixed with osmic and phosphotungstic acids was also examined, and the polarizing microscope was used for certain aspects of the work. The authors particularly determined the structure of the myofibrils and the significance of the transverse bands and found that the sarcolemma is a membrane indistinguishable from that of other cell types.

Anatomy of the Vagus Nerves.

R. G. JACKSON (*The Anatomical Record*, January, 1949) reports an anatomical study in 50 subjects of the vagus nerves in their thoracic course below the pulmonary plexus, and in their distribution to the stomach. The left vagus formed the major portion of the anterior vagus, but generally received branches from the right vagus, while the right vagus formed the major portion of the posterior vagus and generally received branches from the left vagus. Analysis of the œsophageal plexus shows that of the 100 anterior and posterior trunks, 83 became single trunks at some point between the pulmonary plexus and the diaphragm. Seventeen of these 83 trunks divided again to pass through the diaphragm as two or three trunks. Fifteen of the 100 did not become single until they reached the diaphragm, and two were never single. Comparison of the anterior with the posterior trunks shows that the anterior trunks generally become single farther above the diaphragm than do the posterior trunks, and more of the anterior trunks divide again before passing through the diaphragm (28% of the anterior trunks, 6% of the posterior trunks). More of the posterior trunks do not become single until they reach the diaphragm (26% of posterior trunks, 4% of anterior trunks). A greater proportion of the posterior communicating branches are of the "long" type than are the anterior branches. The course, gastric distribution, and hepatic branches of the anterior trunk are described. The variations in course of the posterior vagus and its cœliac division are given and its gastric distribution is described.

Compensatory Renal Enlargement After Unilateral Nephrectomy.

N. M. SULKIN (*The Anatomical Record*, September, 1949) reports cytological observations made on the remaining kidney after unilateral nephrectomy in the rat. He states that it is well known that unilateral nephrectomy is followed by an increase in the size and weight of the remaining kidney; but the present investigation was undertaken to gain more exact knowledge of the cytological nature of the process. Mitotic figures are infrequent in the normal kidney probably due to slow rate of growth, but in sections of kidneys removed forty-eight hours to twenty days after unilateral nephrectomy, mitotic figures in the epithelium were very numerous. The peak mitotic activity occurs between seventy-two hours and two hundred and forty hours after the removal. Binucleate cells are common in the normal kidney, and the number is relatively constant; but in kidneys undergoing compensatory enlargement there is a significant increase in the number of these binuclear cells. The compensatory enlargement appears to affect both cortex and medulla.

Nature of Golgi Apparatus.

G. E. PALADE AND A. CLAUDE (*Journal of Morphology*, July, 1949) conclude that the Golgi apparatus is a gross artifact, namely, a myelin figure, or a complex of myelin figures, which develops in cells during fixation, blackens during silver impregnation or treatment with osmic acid, and is further distorted to various degrees by later handling. The different functional concepts, previously elaborated in connexion with the Golgi apparatus, are discussed in the light of the present findings. It is observed that in the fifty years since it was first demonstrated by Golgi, more than 2000 papers have been devoted to the description and interpretation of this structure, and resounding controversies concerning its origin and significance have arisen among cytologists.

Arteries to Testis and Their Functional Importance.

R. G. HARRISON (*Journal of Anatomy*, July, 1949) gives an account of an experimental study of the effect on the rat testis of interruption of the testicular artery at different points before and after it anastomoses with the vasal artery, and secondarily, the manner of anastomosis of the vasal and cremasteric arteries with the testicular artery in man, as demonstrated by arteriography. Finally consideration is given to the application of the experimental results to the problems of ligature of the testicular artery in man. Twenty-four fresh post-mortem specimens of human testis were examined, and variations in the manner of anastomosis of the three vessels supplying the testis were discovered. Examination by arteriographic methods of the vascularization of the human testis demonstrates that the sum of the diameters of the cremasteric and vasal arteries is at least equal to the diameter of the testicular artery in one-third of all cases examined. In approximately one-third of cases the cremasteric artery does not enter into functional anastomotic connexion with the testicular and vasal arteries. The importance of these observations for the results of division of the testicular artery in man is discussed, and several possible explanations are proposed of the discrepancies in the literature concerning the effects of ligature of the testicular artery in man.

Regenerating Nerve Fibres.

J. T. AITKEN (*Journal of Anatomy*, January, 1949) describes experiments in which nerves were allowed to regenerate along pathways of different lengths (one, four and twelve centimetres ending in a neuroma, and 25 centimetres ending in the skin). Results of experiments showed that the longest nerves had the largest diameters. Over the range investigated there was an increase of 0·5μ in the mean diameter of the fibres for each 10 centimetre travelled. Almost half the regenerating fibres turn round at a neuroma and travel back along the nerve. This effect is greatest in those cases in which the regeneration path is short. Maturation of a regenerating nerve is much more complete when the nerve fibres are allowed to make contact with paralysed (denervated) muscle fibres than when the nerves grow into a normal muscle or into fascia. The possibility of making new functional motor end-plates or reinnervating those which have been denervated produces a great increase in the degree of maturation.

Mesencephalic Root of Trigeminal Nerve.

A. A. PEARSON (*Journal of Comparative Neurology*, October, 1949) finds no evidence in human embryos that elements of the neural crest have been included in the mesencephalon which might give rise to this nucleus as suggested by previous authors. Mesencephalic fifth nerve cells were found to develop from neuroblasts in the alar lamina of the mesencephalon and metencephalon. The shape, character and connexions of these cells are discussed. The several types of these cells, classified according to the shape, size and Nissl granule arrangement, have functional significance. Bipolar and multipolar cells are numerous after birth. The unipolarity of these cells has been over-emphasized by many authors and has led to a limited concept of the connexions and functions of this system of fibres. The connexions of these fibres with the optic tectum, the nuclei of the third, fourth and motor part of the fifth nerves, the cerebellar hemispheres and vermis, the reticular formation, and centres in the *medulla oblongata* are outlined. Finally the functional and phylogenetic aspects of this system of fibres are discussed.

British Medical Association News.

MEDICO-POLITICAL.

THE following statement on friendly society lodge practice in South Australia has been received from the Honorary Secretary of the South Australian Branch of the British Medical Association.

After almost two years of negotiation, the Model Common Form of Agreement between the South Australian Branch of the British Medical Association and the United Friendly Societies Council of South Australia was signed in December, 1948.

In this State the method of payment is by a unit system which is calculated as one unit for a single adult, two units for husband and wife, and three units for a husband, wife and children up to the age of sixteen years. The rate agreed on at this time was 5s. per quarter per unit in the metropolitan area, the State basic wage being then £5 6s.; rates in country areas were also specifically defined, and varied with population and area served. Clause 13 of the above agreement states:

> The rate of payment in terms of this agreement shall be adjusted from time to time by conference between the parties concerned, and such adjustments shall be binding for a period of not less than 12 months, and shall be calculated by altering the capitation fee in accordance with the rise and fall in the State basic wage to be regarded as being £5 6s. per week as at the commencement of this agreement.

In June, 1949, the Negotiating Committee of the Council met a similar body representing the United Friendly Societies Council and proposed that an increase in rates take place at the expiry of the twelve months. The lodge representatives agreed that the increase was warranted in terms of the above clause, but advanced reasons unacceptable to the Council why it should not be agreed on just then. Further discussion followed in November, 1949, and again reasons of a similar kind were advanced to delay the granting of the increase, but it was mutually agreed that there should be an overall increase of 20% as the basic wage had by this time reached £6 11s. It was also agreed that all alterations in payment should take place as from the first lodge night in June of each year.

The term overall increase was introduced to allow the friendly societies to consider methods of payment which would not fall so heavily on the man carrying three units, and when they had some proposal to submit, it was proposed to hold a further conference as soon as practicable in 1950 to agree on the method of payment.

As nothing was heard from the friendly societies by March a letter was written intimating that the South Australian Branch of the British Medical Association expected the agreed on increase to take place as from June, 1950. This brought a reply from the Friendly Societies Council in April, asking for a further conference.

When they were requested to state their proposals on the method of payment, the reply was received that "we have no concrete proposals to submit etc., but would like to say quite frankly that in the opinion of friendly society members the existing rates are adequate". At the conference held in May, 1950, a flat rate system of payment of 36s. was proposed, which after argument advanced to 42s. for the metropolitan area. This proposal was submitted to a representative meeting of lodge surgeons in June and was unanimously rejected. The meeting further considered that the friendly societies had not dealt fairly with lodge surgeons, and furthermore that their representatives had procrastinated at all the recent conferences held between the respective organizations, and in addition, had failed to agree to and implement an increase in fees to which lodge surgeons were justifiably entitled under the provisions of Clause 13 of the present lodge agreement. The meeting instructed the Council of the Branch to give notice under Clause 1 of the agreement that the agreement be terminated. It also instructed the Council that in any future agreement it was desirable that payment be made on a fee-for-service basis.

The Council accordingly gave notice in July terminating the agreement at the end of 1950 and notifying the United Friendly Societies Council that it would be willing to conclude a new agreement on the following terms.

1. That the method of payment be on a fee-for-service basis.

2. That an upper income limit on the following basis be imposed. Single persons without dependants £416 *per annum*; married persons, including the income of wife, but excluding child endowment, £416 *per annum plus* an additional amount of £52 *per annum* for a wife and £26 in respect of each additional dependant.

3. That mileage rates be at the rate of 5s. in the daytime and 7s. 6d. at night.

4. That there shall be provision for annual revision of concessional rates and income limit in accordance with any variations that may be made in the amount of the State basic wage, and that any variation in the one be accompanied by a corresponding variation in the other.

The position has now been reached when after the end of this year all medical services to members of friendly societies on a contract basis will cease, unless the United Friendly Societies Council comes to terms on a new agreement.

Our letter of July 10, 1950, is reproduced herewith together with two further letters.

[COPY.]

SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION (INC.).

178 North Terrace,
Adelaide,
July 10th, 1950.

The Secretary,
United Friendly Societies Council of S.A.,
A.N.A. Buildings,
45 Flinders St.,
Adelaide.

Model Common Form of Agreement.

Dear Sir,

Further to my letter of the 15th ultimo and of your reply thereto under date 30th May last, in which it is suggested by you that under a flat rate system of remuneration for lodge surgeons the rates for juvenile members be 12s. in the metropolitan and 14s. per annum in country areas.

I wish to advise you that at a meeting of lodge surgeons held on Tuesday, June 20th last, it was unanimously considered that the friendly societies have not dealt fairly with lodge surgeons, and furthermore, that your representatives have procrastinated at all of the recent conferences held between the respective organizations, and in addition have failed to agree to and implement an increase in fees to which lodge surgeons are justifiably entitled under the provisions of Clause 13 of the present lodge agreement. Concerning the matter of a flat rate system of remuneration as proposed by your representatives at the conference held on the 11th ultimo, lodge surgeons are unable to agree with your contention that the proposed terms would provide a comparable increase in medical fees, and are of the opinion that the method of payment on a flat rate basis is unacceptable.

The meeting of lodge surgeons referred to above also decided that under the terms as laid down in Clause 1 of the existing agreement, notice be given of the termination of the agreement, and that in any future agreement that may be entered into, it was desirable that payment be made on a fee-for-service basis.

Following upon the above decisions the Council of the South Australian Branch of the British Medical Association hereby gives three months' notice to the United Friendly Societies Council of South Australia that the existing agreement between the respective organizations will be terminated as from the appropriate quarter days as set out in Clause 5 (*f*) following this notice, that is, that it will expire on the last day of November and December next respectively.

I have been asked to advise you, however, that if it is the wish of your Council to enter into another agreement to take the place of that of which notice of termination has been given, the Council of this Association is willing to enter into further negotiations in order to conclude a new agreement on the following terms.

1. That the method of payment be on a fee-for-service basis.

2. That an upper income limit on the following basis be imposed. Single persons without dependants £416 p.a. Married persons including the income of a wife, but excluding child endowment, £416 p.a. plus an additional amount of £52 p.a. for a wife, and £26 in respect of each additional dependant.

3. That mileage rates be at the rate of 5s. in the daytime and 7s. 6d. at night.

4. That there shall be provision for annual revision of concessional rates and income limit in accordance with any variations that may be made in the amount of the State basic wage, and that any variation in the one be accompanied by a corresponding variation in the other.

(Signed) C. O. F. RIEGER,
President.

[COPY.]

UNITED FRIENDLY SOCIETIES COUNCIL OF S.A.

A.N.A. Bld.,
45 Flinders St.,
Adelaide,
19th July, 1950.

The Secretary,
British Medical Association,
178 North Terrace,
Adelaide.

Model Common Form of Agreement.

Dear Sir,

I desire to acknowledge receipt of your President's letter of the 11th inst., relative to the above.

The correspondence under answer was submitted to a full meeting of the United Friendly Societies of S.A. last evening, and I was instructed to forward you the following resolutions carried thereto.

(*a*) The friendly societies view with concern the communication from the S.A. Branch of the British Medical Association.
(*b*) The contention of such association that the cancellation of the agreement is consequent upon the procrastination of the friendly societies' representatives is contrary to fact.
(*c*) The cancellation of the agreement is tantamount to a repudiation of the equity built up with the profession by members of friendly societies over their contributing years of membership.
(*d*) The refusal to accept the flat-rate basis of contribution is difficult to realize when the general expressed opinion of the B.M.A. for some years past has been the introduction of such a scheme.
(*e*) The proposal of the friendly society representatives for a flat-rate contribution (metropolitan areas £2 2s.) in effect provided for a 20% increase on existing rates.
(*f*) It is considered advisable to accept the offer of the B.M.A. to confer with a view to ascertaining how far they may be prepared to go in the matter of a new agreement.

In connection with resolution (*f*) a committee of five has been appointed to confer with your association relative to the possibility of reviewing the present agreement or concluding a new agreement.

In view of your association's cancellation of the present agreement which will take effect as from November-December it is urged that the conference be arranged as soon as convenient to your members. Any date chosen will be acceptable to the members of my committee.

Yours faithfully,
(Signed) L. W. BARROW,
Secretary.

[COPY.]

S.A. BRANCH OF THE BRITISH MEDICAL ASSOCIATION (INC.).

178 North Terrace,
Adelaide,
July 19th, 1950.

The Secretary,
United Friendly Societies Council of S.A.,
A.N.A. Bldgs.,
45 Flinders Street,
Adelaide.

Dear Sir,

In reply to your letter of the 19th inst., it would be appreciated if you would kindly advise me as soon as possible whether in fact the United Friendly Societies Council of S.A. is prepared to further negotiate on the terms and conditions as laid down in the final paragraph of my letter to you of July 10th last.

I desire to make it quite plain that unless this is so, it is considered that no good purpose would be served by holding a further conference.

Yours faithfully,
(Signed) C. O. F. RIEGER,
President.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal Alexandra Hospital for Children on April 18, 1950. The meeting took the form of a series of clinical demonstrations by members of the honorary medical and surgical staff of the hospital. Part of this report appeared in the issue of June 24, 1950.

Imperforate Anus, Bifid Scrotum and Hypospadias.

DR. C. H. WESLEY presented a boy, aged three years and eleven months, who had been born prematurely on May 23, 1946, at thirty-six weeks' gestation, suffering from imperforate anus, bifid scrotum and hypospadias. The baby was admitted to the Royal Alexandra Hospital for Children, aged one hour. No urine or fæces had been passed. Examination of the anus revealed no opening; the sphincter was present and the skin dimpled. Examination of the penis revealed chordee and hypospadias opening midway along the ventral surface of the penis. At operation on the same day an incision was made into the dimple at the site of the anus, and a probe was passed along from the urethral orifice; the passage ended blindly. On the following day cystostomy was performed, and the rectum was pulled down to skin level and the mucosa sutured to the skin. On June 4, 1946, urine was being passed from the orifice in the perineum. On June 6 a catheter was passed through the perineal orifice into the bladder. On June 10 the child was passing urine freely from the perineal orifice; the cystostomy wound was healed. The patient was readmitted to hospital on February 2, 1950, and on the next day the first stage of a plastic operation on the hypospadias was performed. The perineo-anal fistula was patent.

Atresia of the Bile Ducts.

Dr. Wesley's second patient, a boy, aged six months, had been admitted to hospital on January 1, 1950, at the age of seven weeks; he weighed seven pounds. He had been born after normal pregnancy and labour, his birth weight being six and a quarter pounds. He was too weak to suck at birth and was given "Lactogen". He was jaundiced at birth. His condition improved for a week, and then the jaundice began to deepen. The urine was dark and the stools were clay coloured. Vomiting occurred at times, and he did not feed well. Examination of the child revealed a deeply jaundiced, thin baby, with palpable liver and spleen and an umbilical hernia. The stools were pale and the urine dark. A blood count revealed 2,600,000 erythrocytes per cubic millimetre, a hæmoglobin value of 11·6 grammes *per centum* and a colour index of 1·2, a few macrocytes being present; the leucocytes numbered 18,000 per cubic millimetre. Bile pigments and salts were present in the urine; urobilinogen was not detected. Liver function tests provided the following information: the total serum proteins amounted to 6·1 grammes per 100 millilitres, of which albumin made up 3·6 grammes, and globulin made up 2·5 grammes; the albumin-globulin ratio was 1·4:1; the serum bilirubin content was 6·0 milligrammes per 100 millilitres; the thymol turbidity value was two units; the result of the thymol flocculation test was negative; the serum alkaline phosphatase content was 48 King-Armstrong units per 100 millilitres of serum; the serum cholesterol content was 283 milligrammes per 100 millilitres. On January 1, 1950, a transfusion of 120 millilitres of blood was given. On the following day laparotomy revealed atresia of the upper bile duct system. The common bile duct was normal. A tubular gall-bladder was present. No anastomosis was possible. Since operation, the jaundice had subsided and the baby was gaining weight.

Intestinal Obstruction and Meconium Ileus.

Dr. Wesley next presented a baby girl, who had been born by normal delivery at 1.15 p.m. on February 22, 1950. She vomited four times during the first night, the vomitus being bile-stained, and her abdomen became distended twelve hours after birth. Urine was passed normally, but the bowels had not been open since birth, and no meconium was recovered from a catheter passed into the rectum, although there was no obstruction to the passage of the catheter. The child was admitted to the Royal Alexandra Hospital for Children twenty-four hours after birth. The abdomen was then mildly distended, but no masses were felt, and no free fluid was detected in the peritoneal cavity. Hydration was satisfactory. The umbilical cord showed normal atrophic changes. All other systems were normal. Examination *per rectum* revealed no obstruction to the finger and no meconium on the glove. No mass was felt in the pelvis.

X-ray examination of the abdomen was made on February 23 at 2 p.m. and the following report received: "The upper quadrant of the abdomen is occupied and moderately distended with coils of intestine, apparently mainly small intestine. The colon shows only a moderate amount of gas. No fluid levels were detected." The appearance suggested a possible incomplete obstruction in the lower part of the small intestine. A bowel washout produced a clear return and no meconium. Two hours after the child's admission to hospital distension had increased and she was showing signs of respiratory embarrassment. Laparotomy was performed at 5 p.m. on February 23 through a lower right paramedian incision. A small amount of bile-stained fluid was found in the peritoneal cavity. The whole of the peritoneal cavity was filled with coils of dilated small intestine. The large intestine was not dilated. A small band was found proximal to the ileo-caecal junction, passing round the terminal part of the ileum. Proximal to this band the ileum was filled with a large amount of soft meconium. Meconium filled about fifteen inches of small intestine. The consistency of the meconium became softer as the bowel was traced proximally. The band was cut, and it was found possible to push meconium into the ileum. A purse-string suture was then placed in the terminal part of the ileum and the bowel incised at this point. The meconium was milked through the opening, and as much as possible was removed by this method. The meconium was pasty in consistency and of a lighter colour than usual. The bowel was closed by a purse-string suture. The condition of the child was fair at the end of operation. Continuous intravenous therapy was commenced on the child's return to the ward, and a naso-gastric tube was passed and connected to a Wangensteen drainage system. Pancreatin, 0·5 gramme, was instilled every six hours, the suction being controlled by clamping for half an hour. Two days after operation the tube was removed as two napkins had been soiled. The child's condition remained satisfactory for twenty-four hours, but after this distension increased and bowel sounds were absent. Gastric suction was recommenced, but distension continued. The condition of the child had deteriorated by 4.30 p.m. on February 27, and "Prostigmin", a quarter of a millilitre, was given. One hour later the child passed meconium, the distension was relieved, and the bowel sounds became normal in intensity. Next day gastric suction was discontinued and oral feedings were begun. On March 2 expressed breast milk was given, and two days later 120 millilitres of blood were given in a continuous transfusion. On March 10, although the child was taking her feeds well she looked very ill; she had a slight cough, but her chest was clinically normal. On March 14 a fluctuant mass was found below the knee over the thrombosed right saphenous vein (the vein had been ligated after intravenous therapy); this was aspirated, and *Bacterium coli communis* was obtained in pure culture from the pus. X-ray examination of the chest revealed fairly extensive consolidation at the mid-zone of the right lung with elevation of the right hemidiaphragm. The appearance suggested pneumonic consolidation, but embolus could not be excluded. On March 16 treatment with streptomycin, 50,000 international units twice a day, was commenced, as well as with penicillin, 20,000 international units three-hourly. The child improved slightly, but her weight was unsatisfactory. On March 20 the stools, which had been frequent but not bulky, were examined on three successive days, and as the trypsin content was very low and the fat content high, pancreatin administration which had been suspended on March 2 was recommenced. The child was fully breast fed. The weight then began to increase and the stools lessened in number. On April 11 X-ray examination of the chest revealed that resolution in the right lung was complete. The child's weight was increasing slowly. On April 13 her weight was still increasing and she looked well. Dr. Wesley said that examination so far suggested a deficiency of pancreatic secretions, probably due to fibrocystic disease of the pancreas, but investigation of the patient was incomplete as her condition did not warrant duodenal secretion estimation.

Extradural Tumour of Spinal Cord.

DR. T. Y. NELSON presented a boy, aged five years, who had complained of pains in the hips and buttocks over a period of two months before his admission to hospital. One month before his admission his appendix was removed without any change in the character of the pains. In the next few weeks he developed weakness in the legs, which, after admission, rapidly developed into a flaccid paralysis. No sensory changes could be detected in the lower limbs. Lumbar puncture was performed, and only a small amount of cerebro-spinal fluid was obtained, which on examination contained one lymphocyte per cubic millimetre and 500 milligrammes of protein per 100 millilitres. An X-ray examination of the spine showed collapse of the body of the eleventh thoracic vertebra, which the radiologist considered might be either a primary or secondary neoplasm, but he did not suggest an infective origin. It was felt that laminectomy should be performed to determine the exact site of spinal block. Three millilitres of "Pantopaque" were injected by the lumbar route, and the flow was examined by fluoroscopy; the dye stopped at the lower edge of the twelfth thoracic vertebra. Immediate laminectomy was performed, and an extradural tumour was exposed which appeared to come from the anterior part of the spinal canal. It was a moderately firm tumour, which could be separated from the dura and compressed the spinal cord as it coursed posteriorly along its right side. The major part of the tumour was removed and was found to surround the nerve roots of the area. Free hæmorrhage occurred, which could be checked by diathermy and "Oxycel" gauze, but it did not give the impression of coming from a blood-vessel tumour. The following pathological report was given on the specimen removed: "Neoplastic cells in clusters separated by an extremely vascular connective tissue stroma. The cells have oval, deeply staining nuclei. Mitotic figures are present, but not in large numbers. I am unable to determine the origin of the growth, nor can I be certain whether it is a primary or secondary malignant growth. Despite the relative paucity of mitotic figures it is histologically malignant." Dr. Nelson said that since the operation two weeks before the meeting there had been no relief of the paralysis, and the child would be submitted to deep X-ray therapy.

(To be continued.)

Correspondence.

POLIOMYELITIS IN A MOTHER AND NEWBORN CHILD.

SIR: Poliomyelitis occurring in the neonatal period is sufficiently unusual to merit attention, and this infant, in whom preparalytic symptoms were detected on the eleventh day of life, is, I understand, by far the youngest subject in whom the disease has been reported in this State. There are, moreover, very few comparable cases in the literature. At the International Poliomyelitis Conference held in America in 1949, Campos, of Brazil, reported an infant of twenty-five days, and in the discussion which followed mention was made of children who contracted the disease at three and five days respectively. No mention was made of detected infection in the mothers of any of these children, and when asked to explain the source and route of infection in the first week of life, Campos replied that three days was not too short for the incubation period. The cases to be described are more consistent with the behaviour of the virus, so far as it is known. Two other relevant case histories are mentioned by Hargreaves (1950). Both are of women who developed poliomyelitis at or about the date of their confinements, one with paralysis appearing four days before and the other twenty-eight days after delivery. The child of the first was normal at birth and remained so, but that of the second became ill three weeks after birth and later was found to have residual paralyses. There are, of course, many reports of babies born of mothers still in the acute phase of their disease, and of many more whose mothers have had poliomyelitis during their pregnancy. Most of these children have been normal, but there are apparently some grounds for suspicion that if the disease occurs during the embryonic period of gestation it may play a part in the development of certain congenital defects. This hypothesis would suppose that a virus normally so strongly neurotropic would be at least for a time present in the blood-stream of mother and child, which is at present unproven, to say the least. The mother and male infant to be discussed were particularly unfortunate, she because her labour fell during the pre-paralytic phase of the disease and he because he was exposed to infection before his mother's illness was diagnosed. She was confined of this, her first child, without incident other than a moderately heavy blood loss *post partum*; the baby weighed eight pounds five ounces at birth and seemed in every way normal. It was apparent on the second day that all was not well with the mother, but it was not till the third day that the diagnosis of poliomyelitis was made, and by that time she had nursed her baby a number of times. Her paralysis became extensive and severe, as one would expect considering the demands that were made on her muscles during

their most vulnerable period. The baby appeared to be doing well enough on artificial feeding and it was hoped that it might have acquired a protective titre of maternal antibody, but a sudden drop in weight noticed on the eleventh day first gave rise to suspicions that this happy result had not come to pass. On the twelfth day the infant was restless, had a weak "cerebral" cry, was not sucking well, had coarse nystagmoid movements of both eyes, and its weight had then fallen seventeen ounces below birth weight. During the afternoon the first clear evidence of paralysis appeared, namely, flaccidity of the whole right upper extremity, absence of a grasp reflex, and a complete loss of the withdrawal reflex in the right leg. At the same time appeared a left facial weakness, and the respirations began to show periods of irregularity in rate and depth. Cyanosis developed for a short time on one occasion, but quickly responded to oxygen and did not return.

Tube feeding with a mixture of one-eighth strength of sweetened condensed milk was adopted and chloral hydrate given for sedation, and in twenty-four hours there was sufficient general improvement to risk a journey by road to Sydney. This was completed without incident, and the baby was admitted to the Royal Alexandra Hospital for Children under the care of Kathleen Winning. The acute stage passed without complication or extension of the paralysis, and to date, eleven weeks from the onset of paralysis, there has been considerable improvement in the arm and some in the leg. It is felt that these cases are of interest in that the source of the infant's infection can be established beyond reasonable doubt and the time of its exposure fixed within fairly narrow limits. Concern at the mother's condition caused contact between her and the baby to be broken on the second day of the puerperium, even though her condition was as yet undiagnosed, which means that there was a period of between nine and ten days between exposure to infection and the first signs of illness, assuming that the infection occurred during the mother's handling of the baby. It is possible, too, that contact with fæces at birth may have been responsible.

My thanks are due to all those who saw and discussed these patients with me, particularly to Professor Bruce Mayes and Professor Lorimer Dods, to Dr. Kempson Maddox, Mr. Laurence Macdonald and Dr. John Fulton, and to Dr. Kathleen Winning, who confirmed the diagnosis in the infant, and under whose care it was during the acute phase of its illness.

Yours, etc.,

142 William Street,
Bathurst,
New South Wales.
June 21, 1950.

RALPH G. B. CAMERON.

References.

Hargreaves, E. P. (1950), "Poliomyelitis in Cornwall in 1949", *British Medical Journal*, Volume I, page 879.

"Poliomyelitis: Papers and Discussions Presented at the First International Poliomyelitis Conference", pages 51, 52.

THE PREVENTION OF DEFORMITY IN RHEUMATOID DISEASE.

SIR: I should like to congratulate Dr. Michael Kelly on his interesting, informative and thought-provoking paper (THE MEDICAL JOURNAL OF AUSTRALIA, July 1, 1950). However, some of his statements should not go unchallenged. He states that: "In almost any joint the inflammation may be abated by immobilization; and in many cases immobilization brings about a permanent or a temporary reversal of the process." But rheumatoid arthritis is a constitutional disease, as admitted by Dr. Kelly, in which there may be involvements of anterior horn cells, sympathetic ganglia, nerves, muscles, tendons, fibrous tissue and arteries, as well as joint structures. There may be, also, some endocrine abnormality, possibly some antigen-antibody reaction, varying degrees of secondary anæmia, disturbances of the plasma proteins and a reversal of the albumin-globulin ratio, and lastly, pyrexia. We are all cognizant of the variabilities of the disease, how some active cases have only a slightly raised erythrocyte sedimentation rate, whilst in others it is markedly raised. Further, some cases will ankylose even if not immobilized in plaster, and I have seen one such case with complete ankylosis of every joint except the jaws, all within a space of four years. In other cases the affected joints will tend to subluxate owing to softening of the capsule of the joint and the imbalance of the muscles. These latter cases are very favourably affected by immobilization for a prolonged period and will rarely ankylose. In the cold clammy vasoconstrictive type so commonly seen in young women, immobilization of an affected joint for more than fourteen days may precipitate ankylosis, and I have at present under my care a young woman of twenty-eight years whose right knee joint was immobilized for four weeks with resultant complete loss of all movement. The disease is still active and the other knee has become subacutely affected. Some of the finger joints of this patient are completely ankylosed and these joints were not immobilized. Therefore, this patient has ankylosis of joints never immobilized in plaster. As regards rest in hospital, in my experience the young women of the child-bearing age, so often showing vasospastic changes associated with markedly raised erythrocyte sedimentation rate, alteration of the albumin-globulin ratio, and secondary anæmia, need hospitalization, so that rest, combined with movement as well as other general well-known measures, may be employed. This is the established method in the many rheumatological clinics and hospitals visited by me recently in America, England and Scandinavia where the disease is recognized as a systemic one with joint manifestations. I am in agreement, however, that plaster immobilization has been used too infrequently and that the metacarpo-phalangeal joints, if involved, should be treated in the manner Dr. Kelly has indicated to prevent subluxation and ulnar deviation. It is not commonly realized that ulnar deviation cannot occur unless these joints are involved. His advocacy of plaster immobilization for the first metacarpo-phalangeal joints is also very timely as this joint leads to marked disability. In cases showing vasoconstriction I still prefer a limit of fourteen days, but in an experience of over twenty years I can remember only a few cases which showed complete ankylosis of the metacarpo-phalangeal joints. The tendency of these joints is to subluxate rather than ankylose, and this may explain some of Dr. Kelly's very brilliant results. In those knee and wrist joints where there is a tendency to subluxate, I have found immobilization for six or even eight weeks to be of advantage, though this type of case is rarely associated with vasoconstrictive signs and muscular hypertonicity, but, on the contrary, with muscular hypotonicity.

Dr. Kelly also says: "It is a misfortune if the patient has to go to bed with pneumonia." I remember a woman with extensive rheumatoid arthritis of both upper and lower limbs of years' duration, who became confined to bed because of pneumonia and whose active arthritis completely disappeared. She amazed everyone of her family and her medical adviser by the remarkable increase of joint movement and muscle power in less than fourteen days. I have observed this same remission after typhoid fever, diabetic coma and operative procedure. A patient who has lost much weight and who has a markedly raised erythrocyte sedimentation rate with evidence of hæmatological and plasma-protein disturbances needs hospitalization and rest, but also active movement. A rheumatic hospital or ward exclusively set apart for rheumatic patients is needed, and the trend in England and Scandinavia is toward such hospitals and such wards. I for one cannot rejoice with Dr. Kelly "in the shortage of hospital beds", but deplore the lack of facilities which has gone on for so long and which we hope may be altered soon by the active work of the Australian Rheumatism Council. The rheumatic sufferer has had a raw deal in the past, but we can all see the dawn of a better day. As one who did the rounds at the Bath Mineral Water Hospital with the late Dr. Vincent Coates in 1931, I can assure our esteemed colleague, Dr. Kelly, that he, Dr. Coates, practised rest and movement, traction and plaster, in that hundred-bed hospital exclusively filled with rheumatic sufferers.

Yours, etc.,

135 Macquarie Street,
Sydney,
July 11, 1950.

L. J. A. PARR.

THE USE OF "SODIUM PENTOTHAL" ADMINISTERED CONTINUOUSLY IN ABDOMINAL SURGERY.

SIR: I would appreciate the privilege of answering two critics of my method of administering "Sodium Pentothal" in abdominal surgery. One has refuted the article on, as he states, my inexperience, and the other has done the same on, as he states, his own inexperience. Please permit me to be confused.

Amongst his rebuffs Dr. MacDonnell states that the recommended dose of one one-hundred-and-fiftieth of atropine is inadequate. I can only refer him to an even more recent

article (Paton, 1950) where, strangely enough, this same dose is regarded as the optimum for premedication with the thiopentones.

Dr. MacDonnell also states that as "Pentothal" does not exist as such in the body after a period of seven days, it could not have any possible therapeutic value in hypertensive cases. Whilst agreeing with his statement, surely his reasoning is unsound, for we were never taught that a therapeutic measure has to be administered continuously to have a long-lasting beneficial effect.

Dr. Mowat has based his argument on the supposition that if a superficial reflex is present there can be no relaxation in the underlying muscles. Should he, in his peregrinations in abdominal surgery, have succeeded in stimulating this skin to limb reflex from the deeper layers of the abdominal wall, then one must agree with his statement that it is indeed fortunate that his experience is very limited.

Certain of the subject matter in the article was controversial as stated, but scarcely the parts criticized by these two gentlemen.

Yours, etc.,

WIN. FOWLES.

Centaur House,
Queen Street,
Brisbane.
July 26, 1950.

Reference.

Paton, C. (1950), "Myanesin as a Relaxing Agent in Anæsthesia", THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, page 12.

Obituary.

CONSTANCE ELIZABETH D'ARCY.

THE death of Dame Constance Elizabeth D'Arcy, which was recorded in these pages a few weeks ago, brought to a close a distinguished career in medicine, in university circles and in other spheres of activity.

Constance D'Arcy was born in Mudgee, New South Wales, in 1880. She was the fifth daughter of a police constable who had a passion for reading. The Very Reverend Monsignor J. Meany in a broadcast after her death stated that every member of the large family—there were three boys as well as five girls—was brought up in the atmosphere of books; there were books in every room in the house. The love of books no doubt turned the child's attention towards a university education. Be that as it may, when her course at primary school was ended, she announced that she wanted to be a doctor. Those were early days of women doctors and the way seemed far from easy. She had to come to Sydney to prepare for matriculation, but she succeeded and in due course entered the medical school of the University of Sydney.

Constance D'Arcy was a successful medical student. She passed her first year examination in 1899, gaining first class honours in physics. At the second year examination in the following year she passed with credit in anatomy and physiology and gained second class honours in organic chemistry. She passed with credit in the subjects of the fourth year examination in 1902, and also with credit in the fifth year examination in 1903, graduating with second class honours in 1904. In 1905 she was appointed resident medical officer to the Royal Hospital for Women and was the first resident medical officer appointed to that institution. In 1908 she was appointed to the honorary medical staff and served on the surgical side until 1939, when she became honorary consulting gynæcologist and held that position until her death. She was the first woman to serve on the honorary staff. In July, 1925, the Senate of the University of Sydney appointed her lecturer in clinical obstetrics at the Royal Hospital for Women, and she held this position until February, 1939, when she resigned. Saint Vincent's Hospital, Sydney, also claimed a good deal of her time. On the establishment of a clinical school at the hospital and the recognition of the institution as a teaching hospital by the Senate of the University of Sydney in 1923, she was appointed senior gynæcologist. In 1945 she retired from the active gynæcological staff and was appointed honorary consulting gynæcologist, retaining the appointment until her death. She was one of the founders of the Rachel Forster Hospital for women and children, Sydney, and a member of the staff from 1922 to 1942, when she became honorary consulting gynæcologist.

Almost from the time of her graduation Constance D'Arcy was associated in one way or another with the University of Sydney. In 1912 she became associated with the Sydney University Women Graduates' Association, in 1914 with the Sydney University Women's Union, and in 1919 with the Senate. In every sphere she held important office. She was vice-president of the Women Graduates' Association in 1915-1919, in 1924-1928, in 1931-1933 and in 1935-1942. In all other years in this period she was president, namely, 1912-1914, 1920-1923, 1929, 1930 and 1934. The Women's Union elected her to the first Board of Directors in 1914 and appointed her a member of the first finance committee. From 1915 to 1918 she was its vice-president and in 1922-1923 its president. She was Senate representative on the Board of Directors from 1915 to 1918, in 1918-1919 and 1921-1922, and from 1923 to 1925. She was a Fellow of the Senate of the university from 1919 to 1949. On every occasion she was elected by the graduates, except in 1924, when she was elected by the Fellows. She served as Deputy Chancellor from November, 1943, to March, 1946.

Constance D'Arcy manifested an interest in women's organizations outside the University of Sydney. She became vice-president of the Medical Women's Society of New South Wales when that body was reorganized in 1928 and filled the office till 1933; she was president in 1933-1934. On the foundation of the Business and Professional Women's Club of Sydney she became president and held the office for three years.

The British Medical Association claimed Constance D'Arcy's allegiance during the whole of her professional life. She became a member of the New South Wales Branch in 1906 and was a member at the time of her death. She took part in discussions dealing with her special branches of study and gave demonstrations at clinical meetings.

In 1935 she delivered the Anne MacKenzie Oration, choosing as her subject "Maternal Welfare"; the oration was published in THE MEDICAL JOURNAL OF AUSTRALIA of March 30, 1935. She was a member of the Council of Sancta Sophia College within the University of Sydney.

Constance D'Arcy was a Foundation Fellow of the Royal Australasian College of Surgeons; she was also a Member of the Royal College of Obstetricians and Gynæcologists. Her eminence in the profession of medicine, her interest in the public health and her many activities directed to the welfare of the community won recognition in the Birthday Honours in 1935, when she was created by His Majesty the King, Dame Grand Cross of the Most Excellent Order of the British Empire. She was a deeply religious woman and received the Papal decoration of the Cross of Leo.

There were many facets to the character of Constance Elizabeth D'Arcy. She was a large-hearted women with an opinion of her own which she was prepared to defend. Her colleagues did not always agree with her point of view, but she stood for the truth as she saw it. That she had qualities of leadership is shown by the number of important offices to which she was elected. She had an appreciation of moral values and was imbued with a sense of responsibility. She was a good companion at a social gathering and showed her sense of humour in many ways. Her sympathy with the depressed and with those in any kind of adversity was spontaneous. She was generous; it was sometimes thought that her judgements were harsh, but those who knew her felt that she tried to temper mercy with justice. Monsignor Meany said of her that she was a valiant woman, who joined a man's thought to a woman's heart, and many will agree with him. We can say in conclusion that medicine and the community as a whole are at once the poorer for her death and the richer for the qualities which she displayed.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course in Psychiatry for General Practitioners.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a short course in psychiatry for general practitioners, consisting of eight lectures and two demonstrations, will be held from Tuesday, September 12, to Thursday, October 5, 1950. The programme will be as follows:

Tuesday, September 12, 4.15 p.m.: "Ætiology", Dr. E. A. Marsden.

Thursday, September 14, 4.15 p.m.: "Emotional Problems in Infancy", Dr. Mary Carter.

Tuesday, September 19, 4.15 p.m.: "Emotional Problems in Adolescence", Dr. A. T. Edwards.

Thursday, September 21, 5.15 p.m.: "Early Recognition of Psychoses and Their Treatment", Professor W. S. Dawson.

Saturday, September 23, 10 a.m.: demonstration of cases by Dr. Guy A. Lawrance and the staff of Broughton Hall Psychiatric Clinic.

Tuesday, September 26, 4.15 p.m.: "The Psychosomatic Approach, with Special Reference to Tension States", Dr. David Ross.

Thursday, September 28, 4.15 p.m.: "Psychiatry and the Law in General Practice (Including Sex Offenders)", Dr. John McGeorge.

Saturday, September 30, 10 a.m.: demonstration of cases by Dr. Guy A. Lawrance and the staff of Broughton Hall Psychiatric Clinic.

Tuesday, October 3, 4.15 p.m.: "Neuroses in General Practice", Dr. Cedric Swanton.

Thursday, October 5, 4.15 p.m.: "Alcoholism", Dr. S. J. Minogue.

The fee for attendance will be £2 2s. Those wishing to attend are requested to forward their application, together with remittance, to the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, at an early date.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR SEPTEMBER.

Full-Time Course in Psychiatry.

A FULL-TIME course in psychiatry will be held from September 11 to October 6, 1950. Lectures will be given daily at the Royal Melbourne Hospital at 2.15 p.m. and 3.45 p.m., the following lecturers taking part: Dr. A. J. M.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JULY 22, 1950.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	..	..	..	..	..	..	..	..
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	5(4)	3	..	..	..	..	..	..	8
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	1(1)	..	..	..	..	..	1
Diphtheria	4(2)	1	3(2)	..	5(2)	..	..	..	13
Dysentery (Amœbic)	*	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	*	13(13)	..	..	..	..	..	..	13
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	*	*	*	1(1)	*	*	..	..	1
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	..	*	*	*	*	..	..	..
Influenza	*	*	*	..	*	*	..	*	..
Lead Poisoning	*	*	..	*	*	*	*	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(*b*)	*	..	..	..	..	..	..	..	..
Measles	*	*	*	164(79)	*	*	..	1	165
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	9(6)	3	..	15(13)	*	*	*	*	27
Psittacosis	*	..	*	..	..	..	..	..	..
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella(*c*)	*	*	..	*	2(2)	*	..	..	2
Scarlet Fever	12(8)	9(5)	3(1)	12(11)	2(2)	7	..	..	45
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	2	1	*	*	*	*	*	3
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	34(18)	12(9)	5(3)	17(15)	12(8)	4(2)	..	1	85
Typhoid Fever(*e*)	..	..	1(1)	1(1)	..	..	..	..	2
Typhus (Endemic)(*f*)	..	..	..	1(1)	..	..	..	..	1
Undulant Fever	..	1(1)	..	..	..	..	..	..	1
Weil's Disease(*g*)	*	*	6	*	*	*	*	*	6
Whooping Cough	*	*	*	4(3)	*	*	..	..	4
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37, 1946–1947. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
* Not notifiable.
(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil' and para-Weil's disease.

Sinclair, Dr. D. F. Buckle, Professor S. Sunderland, Dr. A. Phillips, Dr. L. B. Cox, Dr. E. Graeme Robertson, Dr. R. S. Ellery, Dr. R. R. Webb, Dr. F. W. Graham, Dr. H. F. Maudsley, Dr. J. K. Adey and Mr. Legge.

Case discussions will be held at 8 p.m. at the Royal Melbourne Hospital, the Alfred, the Royal Park Mental, Prince Henry's and the Children's Hospitals, the Department of Mental Hygiene and the Psychology School of the University of Melbourne. During the mornings attendances may be arranged at individual clinics, and a collection of psychiatric text-books will be made available by Victorian members of the Australasian Association of Psychiatrists.

The course is suitable for candidates for the second part of the D.P.M., or for psychiatrists generally. A detailed programme and enrolment form will be supplied on request. The fee for the course is £26 5s., or *pro rata* for part-time attendance.

Lecture by Professor Arthur W. Grace.

On Thursday, September 7, at 8.15 p.m., Professor Arthur W. Grace, Professor of Clinical Dermatology and Syphilology at the Long Island College of Medicine, New York, will lecture in the British Medical Association Hall, 426 Albert Street, East Melbourne, on "Virus Diseases of the Skin". All members of the profession are invited to attend.

Week-End Course at Bendigo.

The following programme has been arranged for a week-end course at Bendigo on September 16 and 17, 1950.

Saturday, September 16: 2 p.m., "Recent Advances in Gastro-enterology", Dr. R. Andrew; 4 p.m., "The Management of Chronic Rheumatism", Dr. R. Strang; 8.15 p.m., "Thyreotoxicosis", Dr. L. Hurley.

Sunday, September 17: 10.30 a.m., "Pelvic Pain", Mr. L. W. Gleadell.

The fee for this course is £2 2s. or 10s. 6d. per demonstration. Enrolments should be made with Dr. W. Rosenthal, 32 View Street, Bendigo, telephone 477.

Demonstration at Flinders Naval Depot.

On Wednesday, September 13, at 2.30 p.m., Dr. Arthur Joyce will lecture at Flinders Naval Depot on "Eye Conditions in General Practice". This is by arrangement with the Royal Australian Navy.

Clinical Post-Graduate Week at Saint Vincent's and the Children's Hospitals.

A detailed programme will soon be available from the Post-Graduate Committee of the clinical post-graduate week to be held at Saint Vincent's and the Children's Hospitals from October 9 to 13, 1950.

The Royal Australasian College of Physicians.

LECTURES BY DR. DONALD HUNTER.

DR. DONALD HUNTER, F.R.C.P. (London), who is visiting Australia as the William McIlrath Guest Professor for 1950 at the Royal Prince Alfred Hospital, Sydney, will deliver additional lectures in Melbourne and Sydney under the ægis of The Royal Australasian College of Physicians. An invitation is extended by the President and Council of the College to all members of the medical profession to attend. Details of the lectures are as follows.

Melbourne: In the Public Lecture Theatre, Arts Building, the University of Melbourne, on Tuesday, August 8, 1950, at 8.30 p.m., "New Ideas on Toxicology of Metals and Compounds".

Sydney: In the Stawell Hall of The Royal Australasian College of Physicians, on Friday, September 8, 1950, at 8.30 p.m., "Studies in the Metabolism of Skeletal Diseases"; on Wednesday, September 20, 1950, at 8.30 p.m., "Protection of the Worker against Occupational Diseases".

Congresses.

INTERNATIONAL DENTAL CONGRESS.

THE eleventh International Dental Congress of the *Fédération dentaire internationale* will take place in July, 1952. Medical graduates may be admitted as members. The honorary secretary of the organizing committee is Mr. G. H. Leatherman, 13 Hill Street, London, W.1.

Diary for the Month.

AUG. 15.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 16.—Western Australian Branch, B.M.A.: General Meeting.
AUG. 17.—Victorian Branch, B.M.A.: Executive Meeting.
AUG. 22.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 23.—Victorian Branch, B.M.A.: Council Meeting.
AUG. 24.—New South Wales Branch, B.M.A.: Clinical Meeting.
AUG. 25.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 31.—New South Wales Branch, B.M.A.: Branch Meeting.
AUG. 31.—South Australian Branch, B.M.A.: Branch Meeting, E. C. Stirling Lecture.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney)—All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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